

FC310 / 330

SERVICE MANUAL

(for 220/240V)
REVISION 0

Canon

SEPT. 1992

FY8-13CC-000

INTRODUCTION

This Service Manual contains fundamental facts and figures about the plain paper copier FC310/330, and is intended as a reference for service work.

For a quick comparison of the models, see the table that follows.

Model	Manual feed	Multifeed	AE
FC330	No	Yes	Yes
FC310	Yes	No	No

The manual consists of the following:

In CHAPTER 1, "GENERAL DESCRIPTION," a brief discussion of the copier's features, diagrams of its parts, and an explanation of its operation are given.

CHAPTER 2, "COPYING PROCESS," deals with the inner workings of the copier associated with the generation of copies.

CHAPTER 3, "OPERATIONS AND TIMING," explains how the copier's electrical and mechanical systems are related to each other with respect to functions and timing of operations.

In CHAPTER 4, "MECHANICAL SYSTEM," the copier's mechanical system is discussed as to its operation, disassembly, reassembly, and adjustment.

CHAPTER 5, "INSTALLATION," gives step-by-step instructions for installing the copier together with checks to make for each step.

CHAPTER 6, "MAINTENANCE AND SERVICING," contains tables of replacement parts, durables, and consumables.

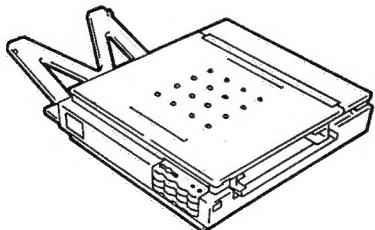
In addition to the above chapters, this manual contains a set of appendixes consisting of a general timing chart and general circuit diagrams.

A separate document entitled SERVICE HANDBOOK is also available for troubleshooting problems in the copier.

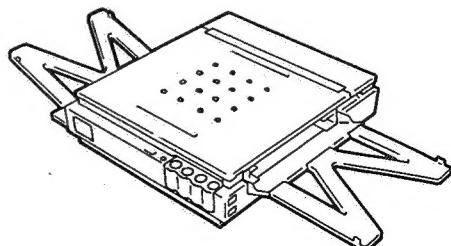
Note:

The contents of this manual may be updated from time to time to reflect improvements rendered to the copier; a Service Information Bulletin will be issued as necessary to cover major changes.

All service persons are expected to be thoroughly familiar with the information contained in this manual, Service Handbook, and Service Information Bulletins, for quick response to the user's needs.



FC 310



FC330

CONTENTS

CHAPTER 1 GENERAL DESCRIPTION

I. FEATURES-----	1-1	III. NAMES OF PARTS -----	1-4
II. SPECIFICATIONS-----	1-2	IV. OPERATION-----	1-6

CHAPTER 2 COPYING PROCESS

I. IMAGE FORMATION-----	2-1
-------------------------	-----

CHAPTER 3 OPERATIONS AND TIMING

I. BASIC OPERATIONS -----	3-1	V. POWER SUPPLY -----	3-46
II. EXPOSURE/COPYBOARD DRIVE SYSTEM -----	3-10	VI. STANDARDS AND ADJUSTMENTS-----	3-48
III. IMAGE FORMATION SYSTEM -----	3-15	VII. SELF DIAGNOSIS-----	3-52
IV. PICK-UP/FEEDING SYSTEM -----	3-31		

CHAPTER 4 MECHANICAL SYSTEM

I. EXTERNALS-----	4-1	II. DRIVE SYSTEM -----	4-5
A. External Covers-----	4-1	A. Copyboard Drive Assembly-----	4-5
1. Detaching the Control Panel Cover -----	4-1	1. Detaching the Copyboard Drive Assembly-----	4-5
2. Detaching the Body Cover-----	4-1	B. Main Motor Assembly-----	4-6
3. Detaching the Top Cover Assembly -----	4-2	1. Detaching the Main Motor Assembly-----	4-6
4. Detaching the Delivery Assembly Cover -----	4-3	III. FEEDING SYSTEM -----	4-7
5. Detaching the Bottom Cover -----	4-3	A. Pick-Up Roller Assembly-----	4-7
B. Copyboard Assembly-----	4-4	1. Detaching the Pick-Up Roller-----	4-7
1. Detaching the Copyboard Cover -----	4-4	B. Registration Roller Assembly-----	4-8
2. Detaching the Copyboard -----	4-4	1. Detaching the Registration Roller-----	4-8
		C. Feeding Assembly-----	4-9
		1. Detaching the Feeding Belt-----	4-9

IV. EXPOSURE SYSTEM -----	4-10	VI. FIXING SYSTEM -----	4-14
A. Scanning System -----	4-10	A. Fixing Assembly -----	4-14
1. Detaching the Scanning Lamp -----	4-10	1. Construction -----	4-14
2. Attaching the Scanning Lamp -----	4-10	2. Detaching the Fixing Assembly -----	4-14
V. CHARGING, DEVELOPING, AND CLEANING SYSTEM -----	4-11	3. Detaching the Pressure Roller -----	4-15
A. Cartridge -----	4-11	VII. ELECTRICAL SYSTEM -----	4-16
1. Outline -----	4-11	A. DC Controller/DC Power Supply PCB -----	4-16
2. Cleaning the Drum -----	4-12	1. Detaching the DC Controller/DC Power Supply PCB -----	4-16
B. Transfer Charging Roller -----	4-12	B. Relay PCB -----	4-17
1. Cleaning the Transfer Charging Roller -----	4-12	1. Detaching the Relay PCB -----	4-17
2. Detaching the Transfer Charging Roller -----	4-12	C. Control Panel PCB -----	4-17
		1. Detaching the Control Panel PCB -----	4-17

CHAPTER 5 INSTALLATION

I. SELECTING THE SITE -----	5-1	III. RELOCATING THE MACHINE-----	5-4
II. UNPACKING AND INSTALLATION-----	5-2		

CHAPTER 6 MAINTENANCE AND SERVICING

I. PERIODICALLY REPLACED PARTS-----	6-1	III. PERIODICAL SERVICING -----	6-1
II. DURABLES -----	6-1	IV. NOTES ABOUT CARTRIDGE -----	6-2

APPENDIX

A. GENERAL TIMING CHART-----	A-1	F. CONTROL PANEL PCB CIRCUIT DIAGRAM-----	A-13
B. SIGNALS/ABBREVIATIONS LIST -----	A-3	G. RELAY PCB CIRCUIT DIAGRAM -----	A-16
C. GENERAL CIRCUIT DIAGRAM -----	A-5	H. SPECIAL TOOLS TABLE -----	A-17
D. DC CONTROLLER/DC POWER SUPPLY PCB CIRCUIT DIAGRAM ---	A-7	I. SOLVENTS/OILS TABLE -----	A-17
E. INTENSITY/AE SENSOR PCB CIRCUIT DIAGRAM -----	A-11		

CHAPTER 1

GENERAL DESCRIPTION

I. FEATURES	1-1	III. NAMES OF PARTS	1-4
II. SPECIFICATIONS	1-2	IV. OPERATION	1-6

I. FEATURES

1. Direct charging.

The charging roller directly charges paper, significantly reducing ozone emission.

2. Auto power-off.

The copier shuts off automatically when left alone for about 5.5 minutes after the last copy operation.

3. Quick start.

The copier's wait time is 0 second, always ready for quick copying work.

4. Cartridge type.

The core of the copier (photosensitive drum, toner case, charging roller, developing assembly, and cleaning assembly) is integrated into a single cartridge. The user need no more than replace the cartridge and perform simple cleaning to maintain the copier in top condition.

5. Variety of copy effects.

In addition to black toner, the user has a choice of several colors. Taking advantage of overlay copying, various copy effects may be obtained through mere replacement of the cartridge.

6. Compact and light.

The copier is compact and light, providing good portability. It can easily substitute as a personal copier.

7. Multifeeding (FC330).

A stack of copy paper may be placed on the pick-up tray. A press on the Copy Start key is all it takes to generate multiple copies.

II. SPECIFICATIONS

	Item	FC310	FC330
Type	Body	Portable (w/ grips)	
	Copyboard	Moving	
	Light source	Fluorescent lamp (9 W)	
	Lens	Lens array	
	Photosensitive medium	OPC (24 dia.)	
System	Copying	Indirect electrostatic	
	Charging	Roller (direct charging)	
	Exposure	Slit (moving copyboard)	
	Copy density adjustment	Manual	Automatic (AE) or Manual
	Development	Dry	
	Pick-up	Manual tray	Multifeeder
	Separation	Curvature + Static eliminator	
	Cleaning	Blade	
	Fixing	Plane heater	
Performance	Document type	Sheet, Book, 3-D object (2 kg max.)	
	Maximum document size	A4	
	Reproduction ratio	1:1 ($\pm 0.7\%$)	
	Wait time	0 sec (approx.; 23 °C)	
	First copy	15 sec (approx.; 23 °C)	
	Continuous copying	Not available	1 to 9 copies or F
	Copying speed	6 copies/min (approx.; A4R or smaller)	6 copies/min (A4R or smaller)
	Copy size	A4 max.; 51 X 88 mm min. (corner radius 5 mm or less)	
	Copy paper type	50 to 128 g/m ² , Tracing paper, Colored paper, OHP film, Postcard (vertical), Labels, Card (88 X 51 mm or more; 200 g/m ² or less), Wrapping paper (63 g/m ²)	
	Two-sided copying	<ul style="list-style-type: none"> • Same edge orientation. • Copying on each side no more than twice. <ul style="list-style-type: none"> • Paper of 50 to 128 g/m². 	
	Overlay copying	•Paper of 60 to 128 g/m ²	•Copying on each side no more than three times.
	Multifeeder tray		5 mm deep (about 50 sheets of A4 60 to 80 g/m ²) 20 copies max., for overlay/two-sided copying.
	Copy tray		9 copies (approx.; A4, 80 g/m ²)
	Non-image width	2 mm (leading edge)	
	Auto power-off	Available (5.5 min)	

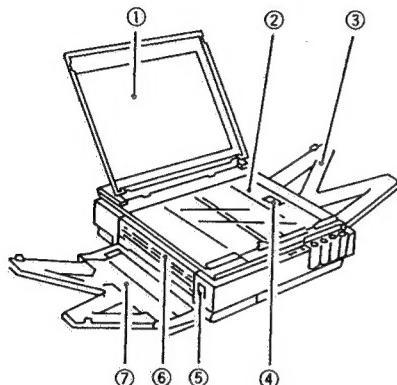
Item		FC310	FC330
Operating environment	Temperature	7.5° to 32.5°C	
	Humidity	5% to 85%	
	Atmospheric pressure	0.6 to 1 atm	
Power supply		Serial numbers	Serial numbers
	220/240V, 50Hz	PTPxxxx PFUxxxx	PTKxxxx PFVxxxx
Power consumption	Maximum	0.7 kW or less	
	Standby	0.1 W (approx.; 5.5 min; reference only)	
	Continuous	0.2 kWh (reference only)	
Noise	Copying	65 dB	Sound power level by ISO
	Standby	40 dB	
Ozone		0.01 ppm or less (average over 8 hr)	
Dimensions	Width	359 mm	
	Depth	398 mm	
	Height	108 mm	
Weight (including cartridge)		9.0 kg (approx.)	
Consumables	Copy paper	Keep wrapped to protect against humidity.	
	Cartridge	See CHAPTER 6.	

Specifications subject to change without notice.

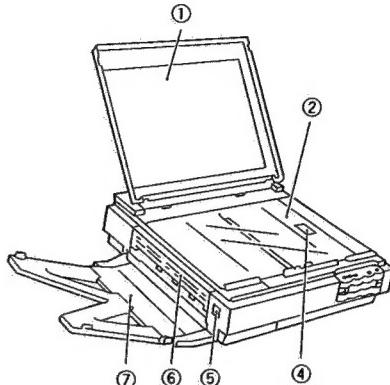
III. NAMES OF PARTS

A. Exterior View

(FC330)



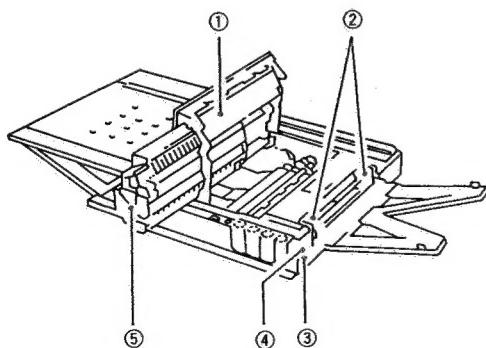
(FC310)



- ① Copyboard cover
- ② Copyboard glass
- ③ Pick-up tray
- ④ Open/Close button

- ⑤ Delivery assembly cover
open/close button
- ⑥ Delivery assembly cover
- ⑦ Copy tray

Figure 1-1

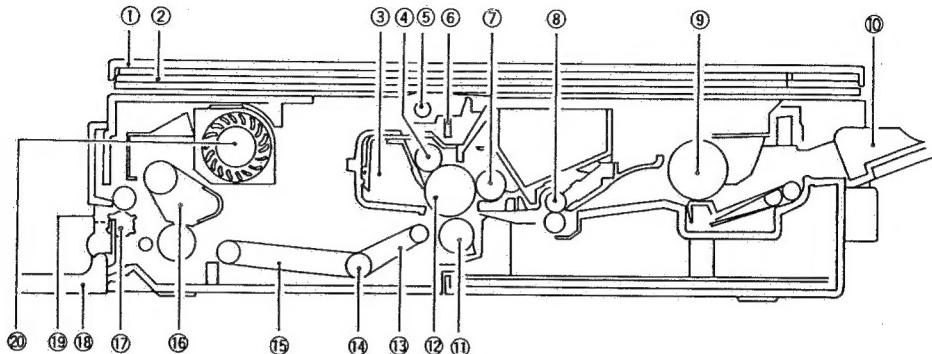


- ① Upper cover
- ② Pick-up guide
- ③ Density correction switch
- ④ Power switch
- ⑤ Cartridge

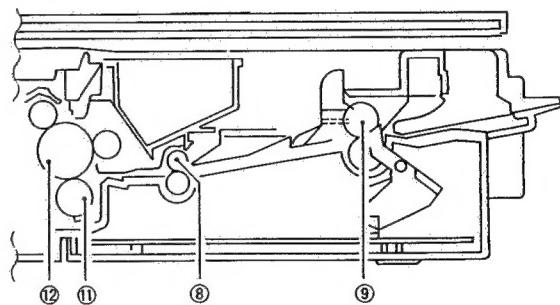
Figure 1-2

B. Cross Section

(FC330)



(FC310)



- | | |
|---------------------------|---|
| ① Copyboard cover | ⑪ Transfer charging roller |
| ② Copyboard glass | ⑫ Photosensitive drum |
| ③ Cleaning assembly | ⑬ Feeding belt 1 |
| ④ Primary charging roller | ⑭ Feeding roller |
| ⑤ Scanning lamp | ⑮ Feeding belt 2 |
| ⑥ Lens array | ⑯ Fixing assembly |
| ⑦ Developing cylinder | ⑰ Delivery roller |
| ⑧ Registration roller | ⑱ Delivery tray |
| ⑨ Pick-up roller | ⑲ Delivery assembly cover open/close button |
| ⑩ Pick-up tray | ⑳ Heat exhaust fan |

Figure 1-3

IV. OPERATION

A. Control Panel

1. FC330

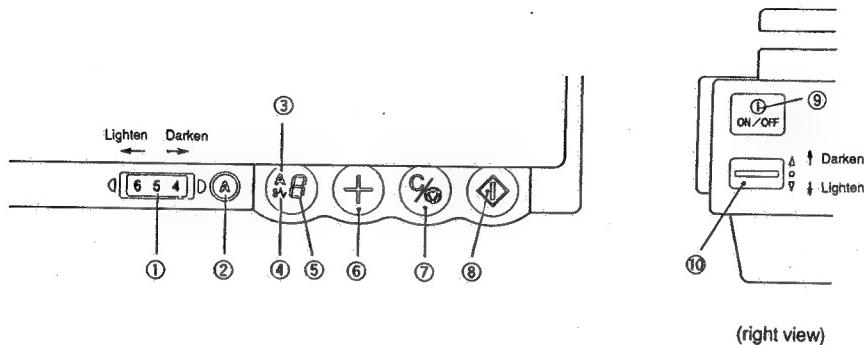


Figure 1-4A

- ① Density Control Dial
 - Press it to select/deselect AE (automatic exposure) mode.
- ② AE key
 - 'A' goes ON when AE mode is selected.
 - 'A' goes OFF when AE mode is deselected.
- ③ AE Indicator
 - 'A' goes ON when AE mode is selected.
 - 'A' goes OFF when AE mode is deselected.
- ④ Jam Indicator
 - Flashes when paper jams inside the copier.
- ⑤ Copy Count Indicator
 - Displays the number of copies entered by pressing the Copy Count Set key.
 - The count decreases for each copy made; the initial number is displayed after the last copy has been made.
 - 'P' is displayed to indicate pick-up failure or absence of paper; 'E' is displayed in response to an error found by self diagnosis.
- ⑥ Copy Count Set Key
 - Each press on the key increases the copy count (up to 9).
 - A press while '9' is displayed causes 'F' to appear, indicating all sheets on the pick-up tray will be used for continuous copying.
- ⑦ Clear/Stop Key
 - During continuous copying, the key serves as a Copy Stop key; the operation stops after finishing the ongoing copy.
 - During standby, the key serves as a Clear key, setting the copy count to '1'.
- ⑧ Copy Start Key
- ⑨ Power Switch
- ⑩ Density Correction Switch
 - Switches copy density among three settings.
 - The density is switched by varying the developing bias.

2. FC310

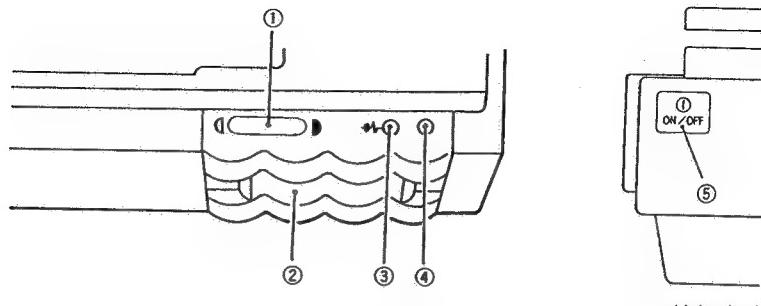


Figure 1-4B

- ① Copy Density Indicator
- ② Density Control Lever
- ③ Jam Indicator
 - Flashes when paper jams inside the copier.
 - Goes and remains ON when an error (self diagnosis) occurs in the copier.
- ④ Main Indicator
 - Flashes during error recovery; remains ON when copying is ready.
- ⑤ Power Switch

B. Making Copies

- 1) Switch the copier ON.
 - If necessary, wait until the intensity of the scanning lamp reaches the specified value.
 - The wait time is about 0 second.
 - The copier will shut itself off in about 5.5 minutes if left alone without key operation.
- 2) Lift the copyboard cover, and place a document face down, along the size index.
 - Place the document so that its center is at ← on the size index (Figure 1-5); then, close the copyboard cover.

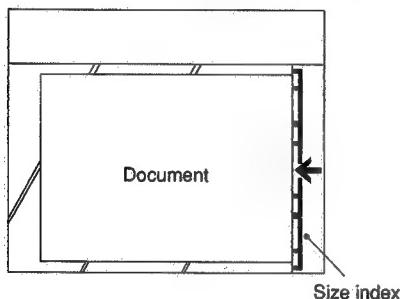


Figure 1-5

- 3) Adjust the copy density to suit the document.
- 4) Slide the pick-up guide to suit the size of copy paper.
- 5) Set copy paper on the pick-up tray.

■ FC330

- Place a stack of copy paper of a size suited to the document on the pick-up tray; make sure the edges of the sheets are flush.
- The stack may be 5 mm (about 50 sheets of plain paper).
 - Postcards must be fed vertically.

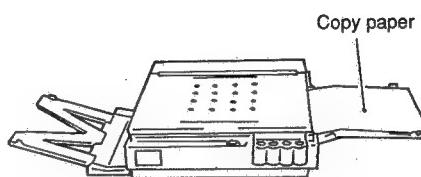


Figure 1-6

- 6) Set the copy count.

■ FC330

Set the number of copies to make (1 to 9 or F) using the + key, and check the Copy Count indicator.

- 7) Press the Copy Start key.

■ FC330

- To stop continuous copying, press the Clear/Stop key; the copier finishes the ongoing copy and stops. The copy count displays the initial count.

Copying on OHP Film

- Set one sheet of film on the pick-up tray for each copy.
- Depending on the environment of the site, a press on the Copy Start key may not pull the film inside the copier; if this is the case, perform the following:

 - 1) Place copy paper under the film; stagger the sheet and film so that the leading edge of the film is about 1 cm behind that of the paper.

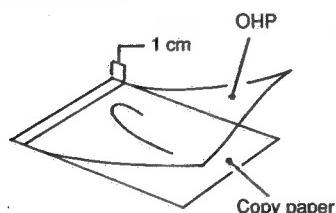


Figure 1-7

- 2) Hold the trailing edge of the copy paper, and set the sheet and film on the pick-up tray.
- 3) While holding the trailing edge of the copy paper, press the Copy Start key (FC330). Let go of the paper when the film begins to move into the copier.

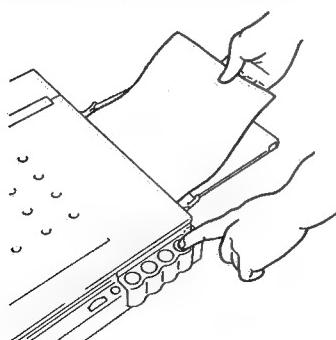


Figure 1-8

Note:

Take away each OHP film delivered to the copy tray.

Manual Feeding

■ FC310

- 1) Set a document on the copyboard.
- 2) Adjust the Density Control lever to suit the document.
- 3) Slide the pick-up guide to suit the size of copy paper.
- 4) Insert copy paper along the pick-up guide.
 - The copier starts copying operation automatically as soon as it detects paper.
 - To continue copying, insert the next paper when the copyboard starts to return.

Making Two-Sided Copies

- 1) Turn over the copy while maintaining its front-rear orientation.
- Make sure that the paper is not moist or curled.
- Use paper of 60 to 128 g/m² when making two-sided copies.
- Do not process each side more than twice.

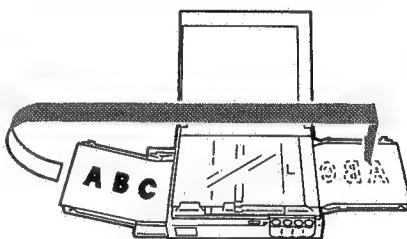


Figure 1-9

Making Overlay Copies

You can make two- or three-colored copies by replacing the cartridge.

- Use paper of 60 to 128 g/m² when making overlay copies.
- Do not process each side more than three times.

C. Jam Indicator

The Jam indicator starts to flash when paper jams inside the copier.

- Take care not to tear the paper when removing it; otherwise, be sure to remove all pieces of paper.

- 1) Move the copyboard to the left until it stops.
- 2) Press the open/close button, and open the top cover.
- 3) Remove the jam.
 - If the jam is in the pick-up or fixing assembly, hold the edge of the paper with both hands, and pull it out slowly through the opening of the top cover.
 - If the jam is in the delivery assembly, press the delivery assembly open/close button to open the delivery cover; then, detach the paper from the delivery cover, and pull it slowly in the direction of delivery.
- 4) Close the top cover and delivery cover; then, move the copyboard to the center.
- To resume copying, switch the copier ON, set the desired copy count, and set the copy density.

D. Add Paper Indicator

■ FC330

'P' flashes if you try to make a copy when the pick-up tray has run out of paper.

- 1) Check the pick-up tray for copy paper.
- 2) If no paper is on the tray, place paper. If a stack of paper is on the tray, remove it first, then place it back after putting its edges flush.
- 3) Press the Copy Start key. 'P' goes OFF, and the remaining number of copies are made.

E. Replacing the Cartridge

1. Time to Replace the Cartridge

When the cartridge is running out of toner, copies tend to show white lines or vertical white spots (Figure 1-10).

Preface

Thank you for purchasing this Canon copier. This manual provides the method of use. It is recommended that you read this manual in order to familiarize yourself with its capabilities. After you have read this manual,

Canon copier. This manual provides the method of use. It is recommended that you read this manual in order to familiarize yourself with its capabilities. After you have read this manual,

▲CAUTION:

In this manual, CAUTION indicates a procedure that must be followed.

AGES with this manual in personal in

Figure 1-10

If white lines or spots appear on copies, replace the cartridge as follows:

- 1) Remove the cartridge from the copier, and rotate it several times as shown in Figure 1-11.

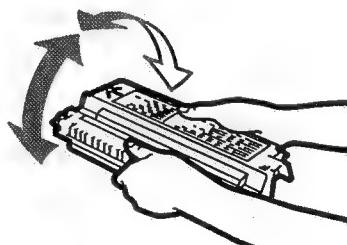


Figure 1-11

- 2) Set the cartridge back in the copier, and make a copy.
 - a. If the output returns to normal,
 - The cartridge may be used further; advise the user, however, to obtain a spare cartridge.
 - b. If the output fails to return to normal,
 - Replace the cartridge as described below.

2. Replacing the Cartridge

- 1) Move the copyboard to the left until it stops; then, press the open/close button to open the top cover.
- 2) Slide the cartridge out of the copier.
- 3) Hold the cartridge with the Warning label facing up, and rotate it about 90 degrees in both directions.

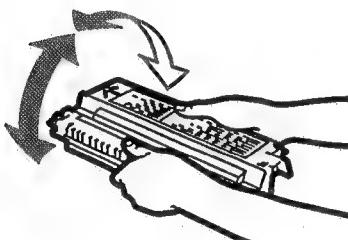


Figure 1-12

- 4) Detach the tip of the seal attached to the cartridge, and pull it straight out to the front; about 50 cm.

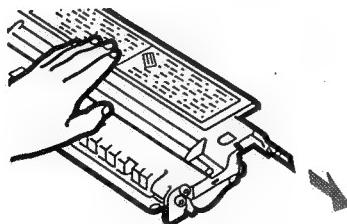


Figure 1-13

- 5) Hold the cartridge with its Warning label facing the left, and insert it in the copier with care until it butts against the rear.

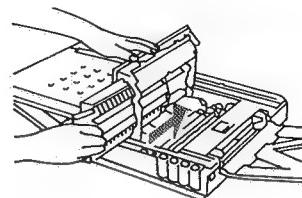


Figure 1-14

- 6) Close the top cover, and return the copy-board to the center.

Note:

You can replace the black toner cartridge with any color cartridge the same way.

F. Changing the Density

■ FC330

You have a choice of three settings for automatic density adjustment mode (AE); switch the density if the copy is too dark or too light.

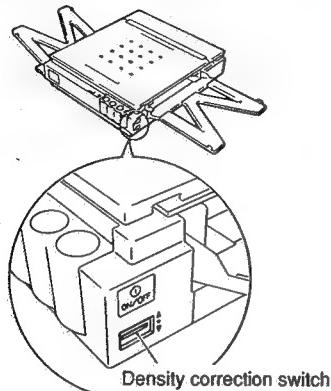


Figure 1-15

Note:

You can also switch the density among three settings in manual density adjustment mode.

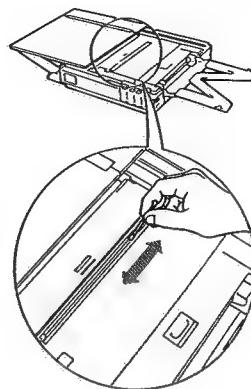


Figure 1-16

- 3) Open the copier, and remove the cartridge.
- 4) Put a flat-tipped cotton wad in the lens array (rear) groove, and move it back and forth.

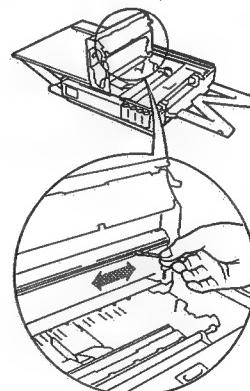


Figure 1-17

G. Cleaning

Advise the user to clean the following if the copies are soiled.

1. Copyboard Glass/Copyboard Cover

Wipe the part with a moist cloth; then, dry wipe it.

If dirt cannot be removed, wipe the part using mild detergent; then, dry wipe it.

2. Lens Array

1) Move the copyboard to the left until it stops.

2) Put a cotton wad in the lens array groove, and move it back and forth lightly.

3. Pick-Up Roller

- 1) Open the top cover.
- 2) Dry wipe the pick-up roller while rotating it in pick-up direction with a cloth.

Note:

Do not make copies until the pick-up roller has completely dried.

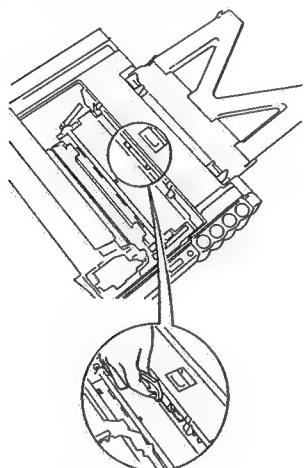


Figure 1-18

H. 'E1'

'E1' goes ON if the fixing film becomes displaced to the front or rear. In addition to an error associated with the copier, the site conditions can cause such an error.

If the copier is not installed on a level floor, advise the user to move the copier.

The copier is equipped with E1 recovery mode (see p. 3-38).

Advise the user to perform the following.

- 1) Switch the copier ON.
 - If 'E1' (FC330) or Jam indicator (FC310) still goes ON, switch the copier OFF, and switch it back ON after about 10 minutes, i.e., when the fixing heater has cooled to 100°C or less.

Note:

Advise the user to call for service if 'E1' recurs after the second activation of recovery mode.

J. When Not Using the Copier for a Long Time

Advise the user to perform the following if she/he does not have any plan to use the copier for a long time.

- 1) Disconnect the power plug.
- 2) Place the copier in a dust-free, sunlight-free place.

CHAPTER 2

COPYING PROCESS

1 IMAGE FORMATION ————— 2

I. IMAGE FORMATION

A. Outline

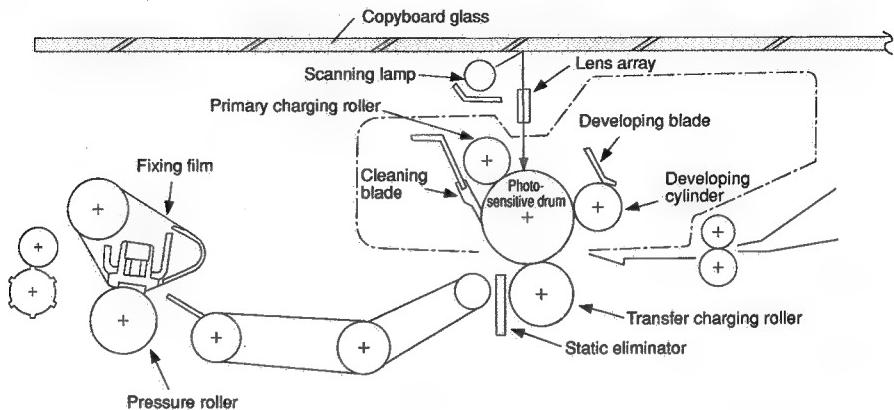


Figure 2-1

The copier is an indirect photoreproductive system constructed as shown in Figure 2-1.

The image formation process consists of seven steps as discussed below.

- Step 1 : Primary charging (negative)
- Step 2 : Image exposure
- Step 3 : Development (AC and DC bias)
- Step 4 : Transfer (negative)
- Step 5 : Separation
- Step 6 : Fixing
- Step 7 : Drum cleaning

The photosensitive drum has a layer construction: the photoconductive layer on the outside and the conductive aluminum base, inside.

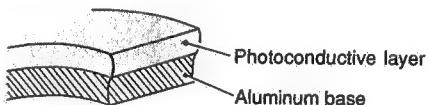


Figure 2-3

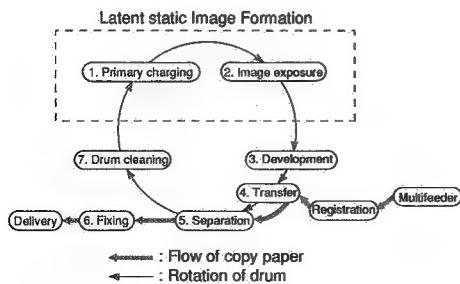


Figure 2-2

B. Latent Static Image Formation

The latent static image formation block consists of two steps: primary charging and image exposure. At the end of the block, negative charges are left on the surface of the photosensitive drum corresponding to the black areas of the document, while negative charges are removed from the surface corresponding to the white areas.

Since the images created by electric charges are not visible to the human eye, they are called *latent static images*.

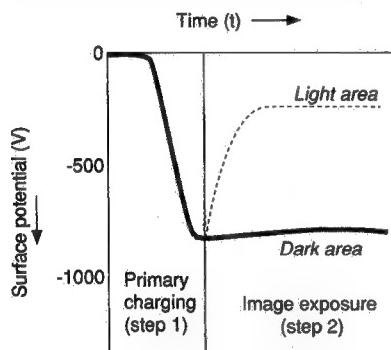


Figure 2-4

Step 1 Primary Charging

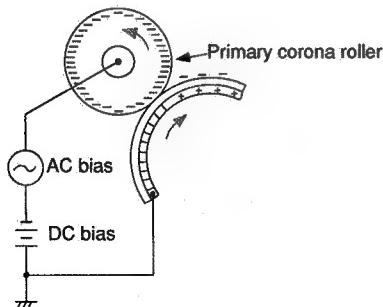


Figure 2-5

The surface of the photosensitive drum is charged to a uniform negative potential to prepare for the formation of latent static images.

The copier uses its primary charging roller to charge the photosensitive drum directly.

The primary charging roller is constructed of conductive rubber to which a DC bias as well as an AC bias is applied.

The AC bias serves to maintain the surface potential of the photosensitive drum uniform, eliminating the necessity for pre-exposure.

The DC bias applied at the same time as the AC bias helps produce primary potential.

Note:

Compared to conventional corona charging, direct charging requires less application voltage and hardly generates ozone.

Step 2 Image Exposure

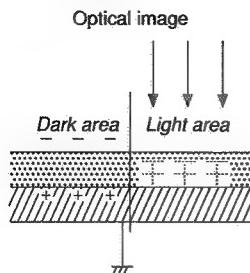


Figure 2-6

The optical image from the document is directed to the surface of the photosensitive drum, thereby neutralizing the charges in light areas.

Step 3 Development

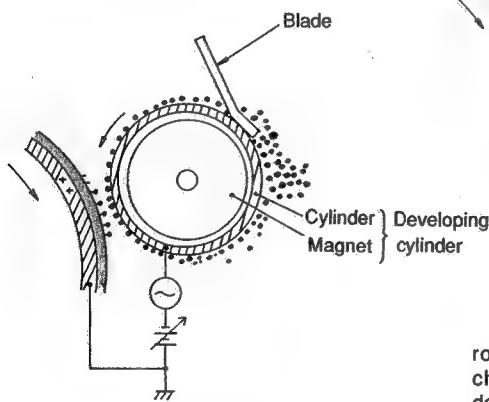


Figure 2-7
(black developing assembly)

As shown in Figure 2-7, the developing assembly is composed of the developing cylinder and rubber blade; the developing cylinder in turn consists of a fixed magnet and a cylinder that revolves around it.

The black developer is a single-component developing agent, made up of magnetite and resin. The developer has insulating properties, and becomes charged to a positive potential by friction against the rotating cylinder and blade.

The color developer is also a single-component developing agent, made mostly of resin.

The developer is collected around the blade by the brushing roller. In addition to collecting the developer, it also brushes developer off the developing cylinder; see Figure 2-8.

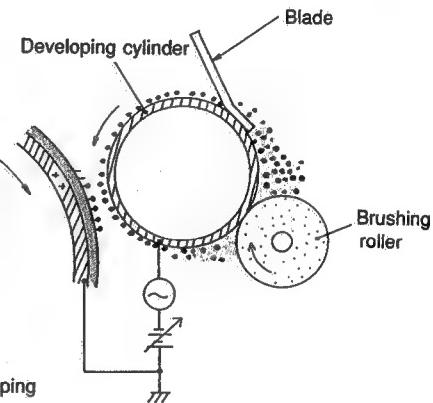


Figure 2-8

The developer is moved between the rotating developing cylinder and blade, charged to a positive potential, and is deposited in a uniform layer on the cylinder by the blade.

Both AC bias and DC bias (negative component) are applied to the developing cylinder at the same time, generating developing bias; as a result, the negative component of the developing bias is greater than the positive component.

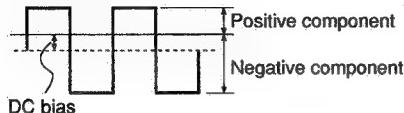


Figure 2-9

During copying operation, the toner is attracted to the photosensitive drum by the surface potential of the drum and the developing bias (positive component) to turn the latent static image to a visible image.

Excess toner is repelled by the photosensitive drum by the surface potential of the drum and the developing bias (negative component).

The DC bias affects copy density and fogging; a higher bias, i.e., closer to 0 V, increases the density but, at the same time, tends to fog the background of the copies.

Step 4 Transfer

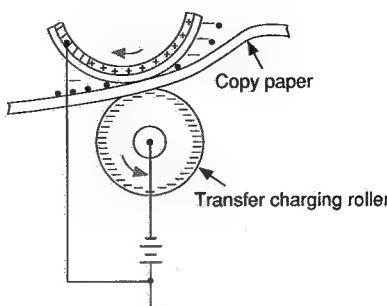


Figure 2-10

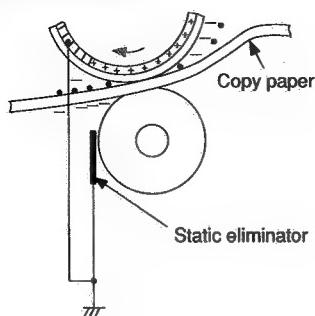
A negative voltage is applied to the back of copy paper to transfer toner from the photosensitive drum to the paper.

The copier uses a roller transfer method; compared to conventional corona transfer methods, it provides the following advantages:

- Generates virtually no ozone.
- Ensures good paper transport, as the paper is held between the roller and drum.

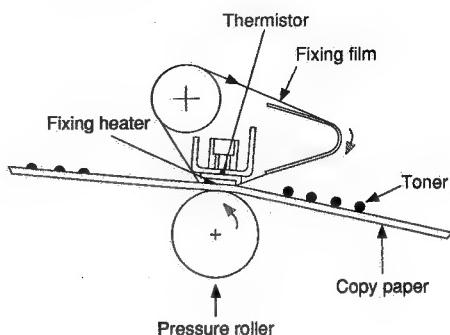
Note:

A jam can cause toner to stick to the transfer roller. To clean the transfer charging roller, the copier switches polarities of the transfer voltage during copying sequence (other than transfer), thereby returning the toner on the roller to the drum.

Step 5 Separation**Figure 2-11**

Copy paper is separated from the photosensitive drum using the rigidity of the paper.

Thin paper, with little rigidity, can wrap around the drum. To prevent this, a grounded static eliminator is provided to weaken the static adhesion between photosensitive drum and copy paper, thereby encouraging separation.

Step 6 Fixing**Figure 2-12**

After receiving images, the copy paper moves between fixing film and pressure roller so that the toner images are fused into the fibers of the paper.

The fixing film is made of special material and has a seamless construction; it is designed so that melting toner will not stick to the film, making a cleaning mechanism for the fixing assembly unnecessary.

The fixing heater is plane-shaped, and heated only where the fixing film comes into contact, eliminating the need for warm-up time.

The temperature of the fixing heater is monitored by the thermistor (TH1) attached to the center of the fixing heater so that the heater is controlled to a specified temperature at all times.

Step 7 Drum Cleaning

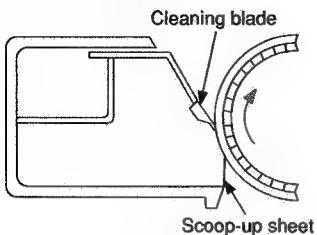


Figure 2-13

The cleaning blade scrapes the residual toner off the surface of the photosensitive drum to prepare for the next copying cycle.

The toner is collected by the scoop-up sheet.

CHAPTER 3

OPERATIONS AND TIMING

In outline diagrams, **III** represents mechanical drive paths, and **→** indicates electrical signal paths. The drum takes 1.5 sec to complete a single rotation.

Signals in digital circuits are identified as 1 for High and 0 for Low. The voltage of signals, however, depends on the circuit.

Nearly all operations of the product are controlled by a microprocessor; the internal workings of the processor are not relevant to the serviceman's work and, therefore, are left out of the discussions. By the same token, no repairs are prescribed for the PCBs at the user's premises; for this reason, PCBs are discussed by means of block diagrams rather than circuit diagrams.

For the purpose of explanation, discussions are divided into the following: from sensors to OC controller PCB input ports; from OC controller output ports to loads; and minor control circuits and functions.

I. BASIC OPERATIONS	3-1	V. POWER SUPPLY	3-46
II. EXPOSURE/COPYBOARD DRIVE SYSTEM	3-10	VI. STANDARDS AND ADJUSTMENTS	3-48
III. IMAGE FORMATION SYSTEM	3-15	VII. SELF DIAGNOSIS	3-52
IV. PICK-UP/FEEDING SYSTEM	3-31		

I. BASIC OPERATIONS

A. Basic Construction

The copier can be divided into four functional blocks: pick-up/feeding, exposure, image formation, and control blocks.

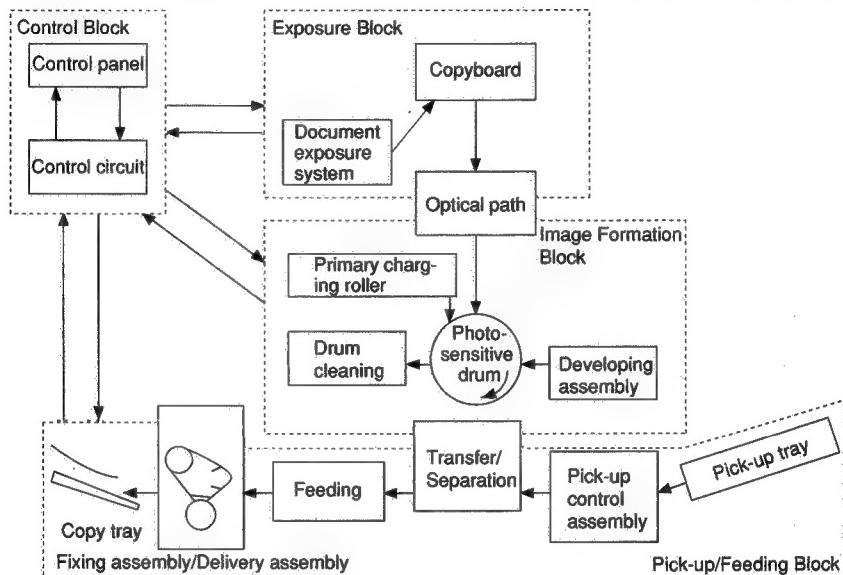


Figure 3-1

B. Outline of Electrical Circuit

The copier's main electrical mechanisms are controlled by the microprocessor on the DC controller/DC power supply PCB. According to the program stored in advance, the microprocessor reads input signals from the control keys, and generates signals to drive such loads as motors, solenoids, and lamps, as necessary.

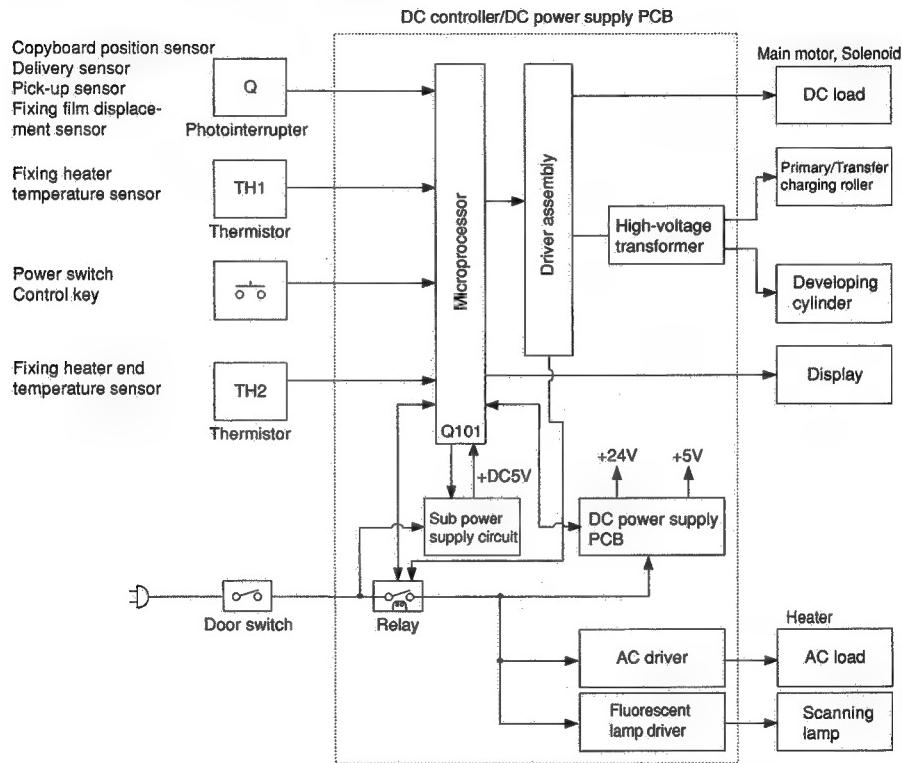


Figure 3-2

C. Inputs to DC Controller

Inputs to DC Controller (1/2)

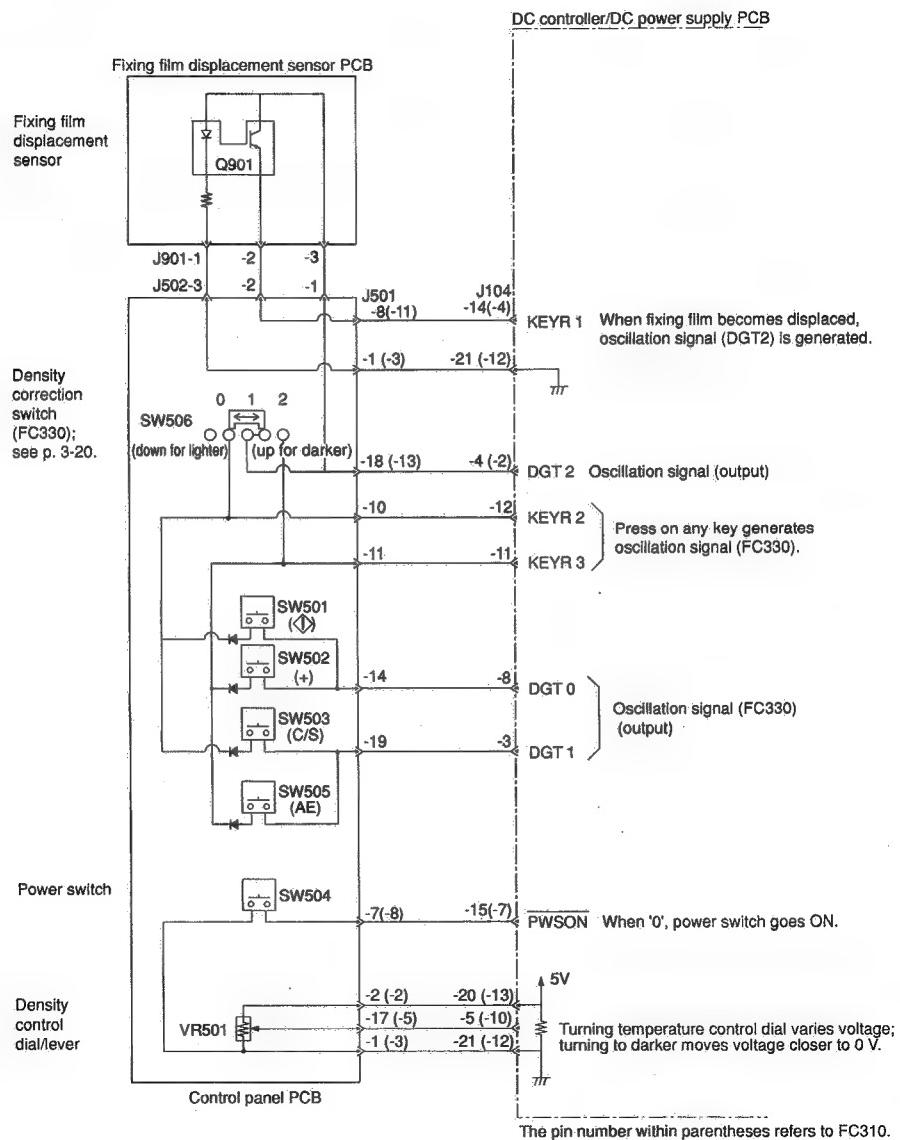


Figure 3-3

Inputs to DC Controller (2/2)

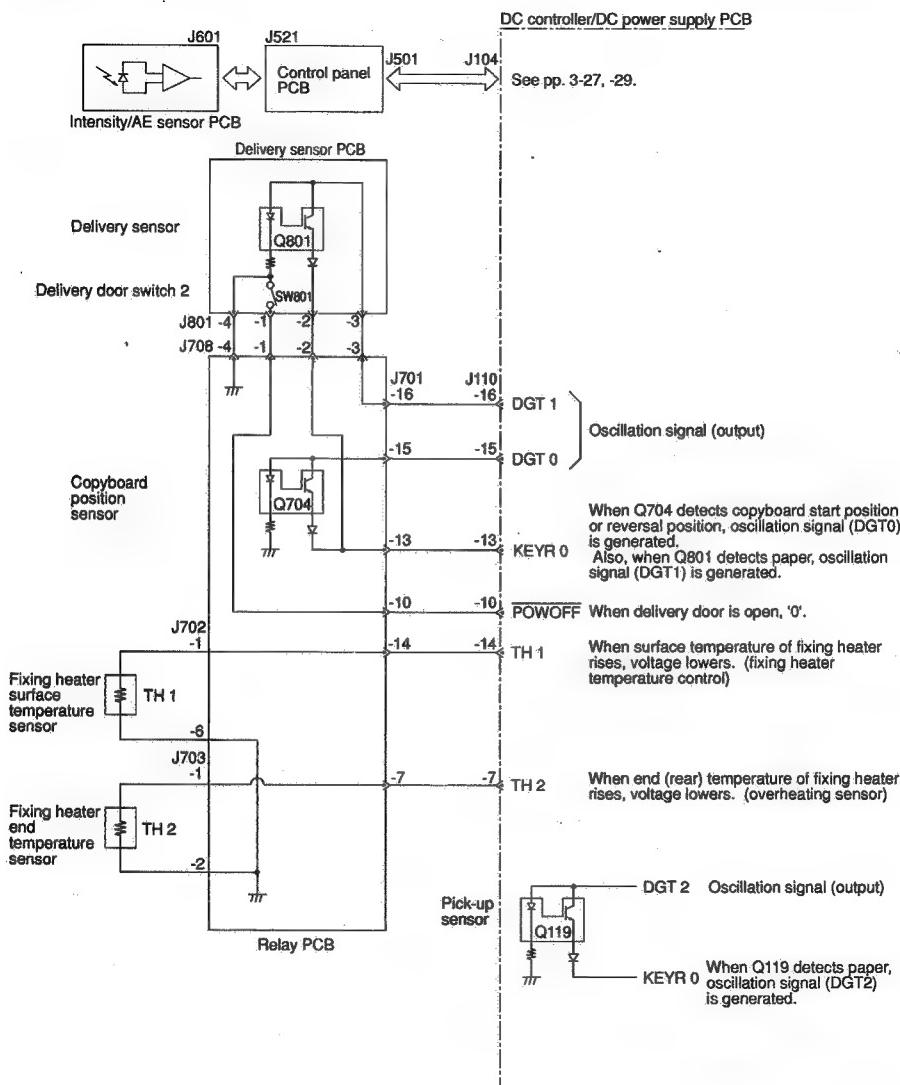


Figure 3-4

D. Outputs from DC Controller

Outputs from DC Controller (1/2)

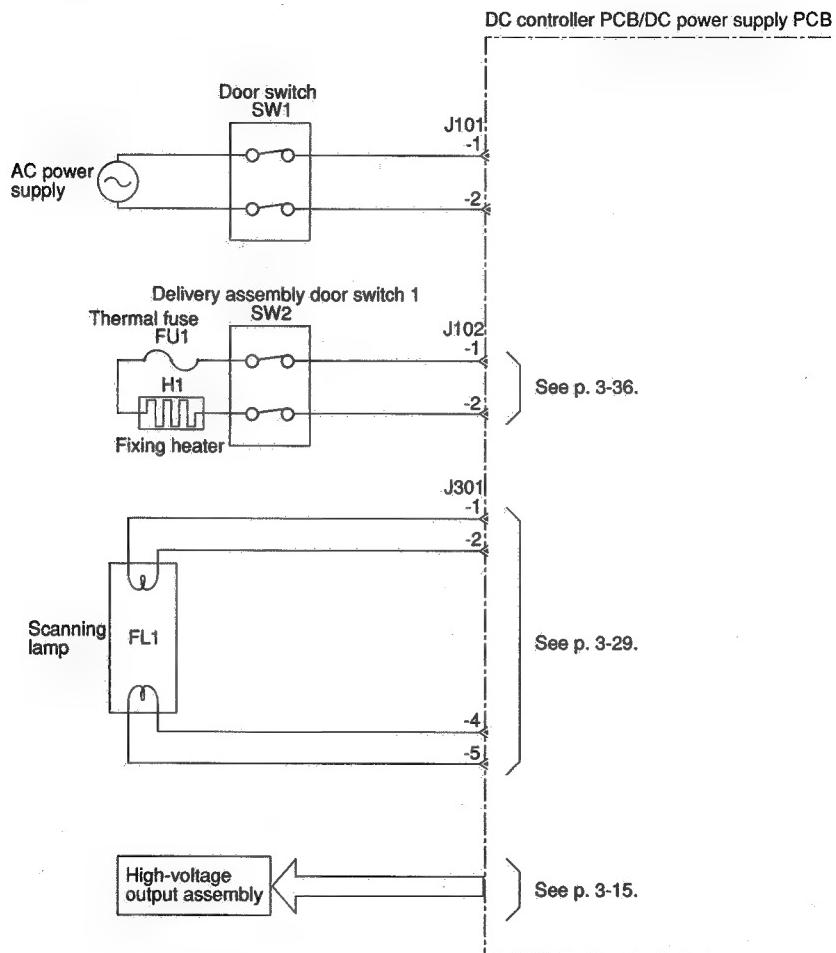


Figure 3-5

Outputs from DC Controller (2/2)

a. FC330

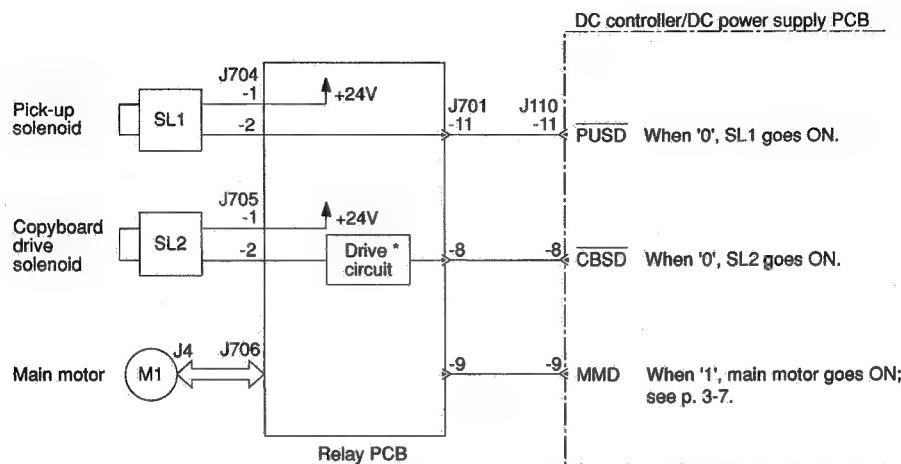


Figure 3-6A (FC330)

b. FC310

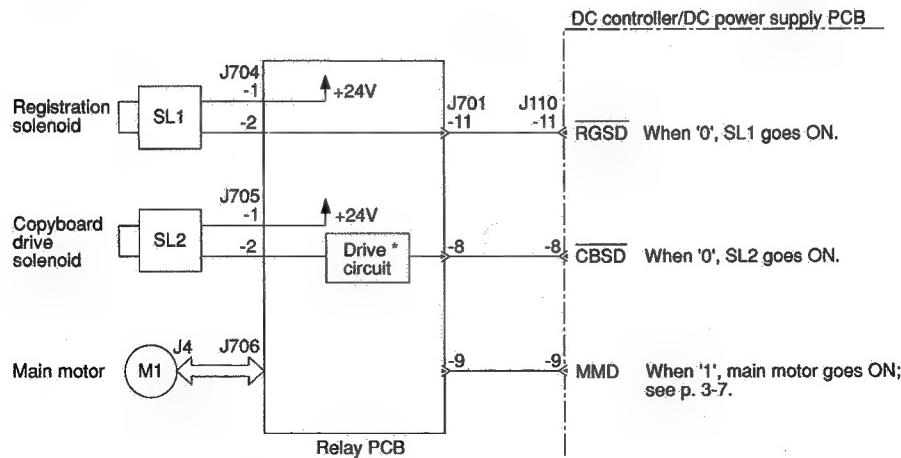


Figure 3-6B (FC310)

*Stable operation is ensured by switching the voltage applied to the solenoid by the drive circuit from 24 V to 15 V.

E. Main Motor Control Circuit

1. Outline

Figure 3-7 shows the circuit that controls the main motor (M1), and the circuit has the following functions:

- turns the main motor ON and OFF.
- controls the main motor speed (constant)

The main motor (M1) is a DC motor with a built-in clock pulse generator (encoder). Clock pulses (MMCLK) corresponding to the revolution of the motor are generated while the motor is rotating. The speed control circuit controls the speed of the motor with reference to these clock pulses.

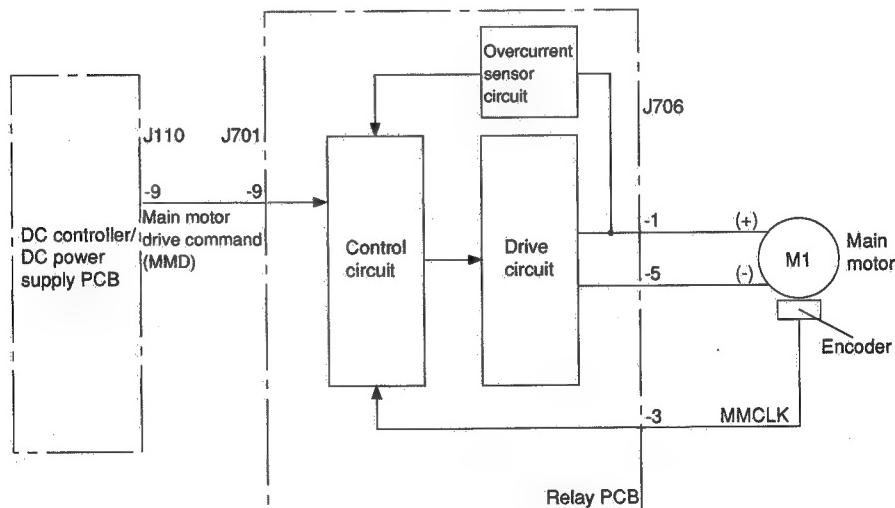
2. Operation

When the main motor drive command (MMD) from the DC controller/DC power supply PCB goes '1', the motor driver drive circuit goes ON; as a result, the main motor starts to rotate at a constant speed.

3. Overcurrent Sensor

When the overcurrent sensor circuit detects an overload in the main motor (M1), the speed controller circuit exerts control so that the rotation of the motor is slowed down.

If the revolution of the main motor falls below a specific revolution, however, an error associated with 'E2' can occur.



F. Basic Sequence of Operations (A4, 2 copies)

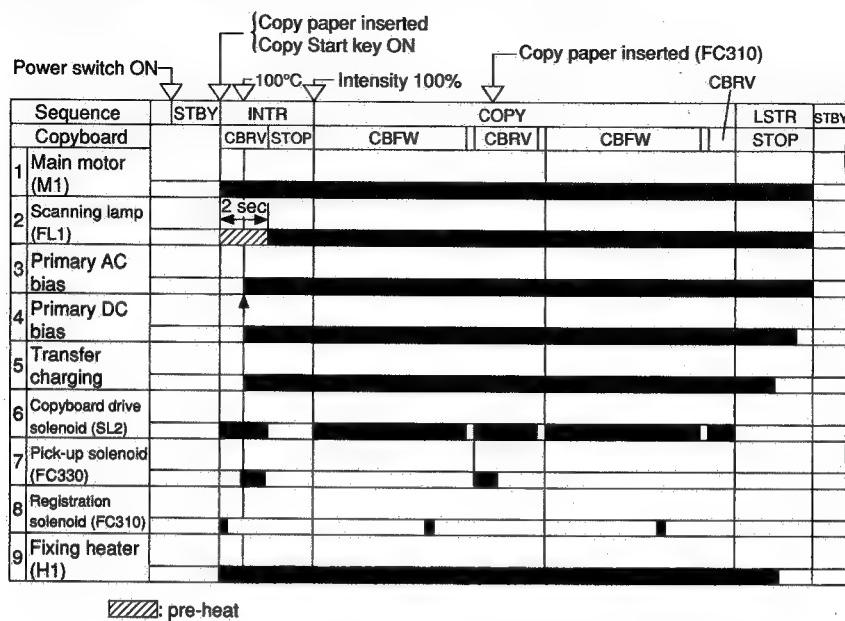


Figure 3-8

Period		Description	Remarks
STBY (Standby)		<ul style="list-style-type: none"> • Between when the copier is switched ON and when the Copy Start key is pressed. • Between when LSTR is over and when the Copy Start key is pressed. 	<ul style="list-style-type: none"> • Waits for a press on the Copy Start key.
INTR (Initial Rotation)		<ul style="list-style-type: none"> • For about 4 sec after STBY is over. 	<ul style="list-style-type: none"> • Waits until the pre-heating of the scanning lamp is over and the ON intensity becomes stabilized. • Executes pick-up. • Removes residual charge from the photosensitive drum and stabilizes the drum sensitivity in preparation for copying operation.
COPY	CBFW (Copyboard Forward)	<ul style="list-style-type: none"> • While the copyboard is moving forward (about 6.7 sec). 	<ul style="list-style-type: none"> • The scanning lamp illuminates the document, and the reflected optical image is projected to the photosensitive drum through the lens array. • The copy paper is moved to the transfer assembly.
	CBRV (Copyboard Reverse)	<ul style="list-style-type: none"> • While the copyboard is moving in reverse (about 2.8 sec). 	<ul style="list-style-type: none"> • Returns the copyboard to the start position in preparation for the next copy; if last copy, the copyboard is returned to the home position. • In continuous copying, the pick-up signal is generated for pick-up operation.
LSTR (Last Rotation)		<ul style="list-style-type: none"> • After CBRV for the last copy is over until 1 sec after the copy paper has moved past the delivery sensor. 	<ul style="list-style-type: none"> • Discharges the last copy.

Table 3-1

II. EXPOSURE/COPYBOARD DRIVE SYSTEM

A. Outline of Exposure System

The scanning lamp (FL1) remains ON at all times as long as the main motor is rotating. While the copyboard is moving forward, the scanning lamp (FL1) illuminates the document, and the reflected light is projected to the photosensitive drum through the lens array.

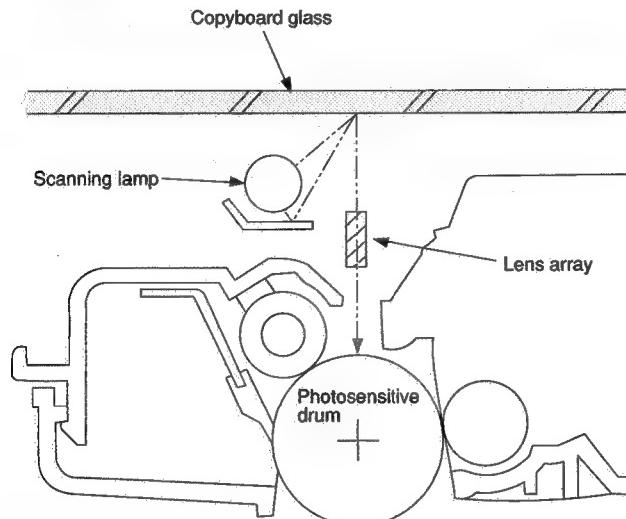


Figure 3-9

B. Copyboard Drive System

1. Outline

The copyboard is moved forward or in reverse by transmitting the drive of the main motor (M1) to the copyboard drive gear (pinion). Figure 3-10 illustrates the movement of the copyboard.

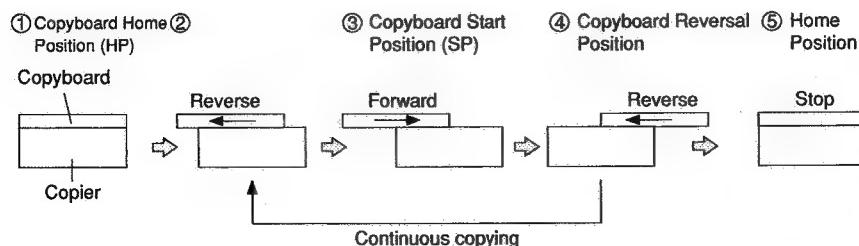


Figure 3-10 Front View

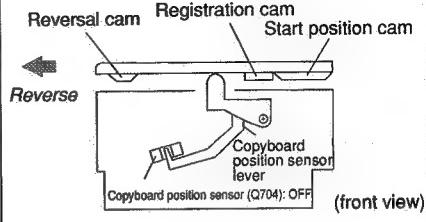
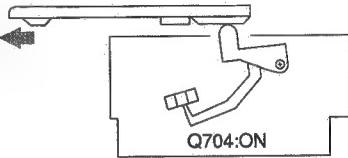
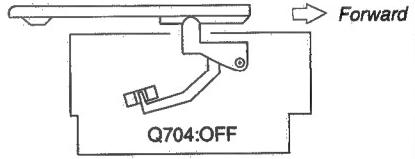
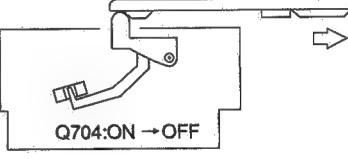
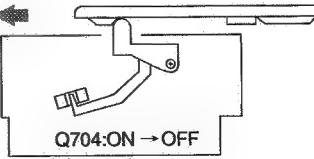
Copyboard position sensor (Q704)		Description	Copyboard position (cams)
Forward	Reverse		
		<ul style="list-style-type: none"> • Copyboard is at the home position. • Copyboard solenoid goes ON in response to a press on the Copy Start key or insertion of copy paper. 	 <p>Reversal cam Registration cam Start position cam Reverse Copyboard position sensor lever Q704:OFF (front view)</p>
	↑	<ul style="list-style-type: none"> • Copyboard is at the start position. • Copyboard drive solenoid goes OFF. 	 <p>Reverse Q704:ON</p>
↓		<ul style="list-style-type: none"> • Copyboard drive solenoid goes ON after the intensity of the scanning lamp has reached 100%. • AE measurement starts. • Registration roller goes ON (by registration cam); see p. 3-34. 	 <p>Forward Q704:OFF</p>
↓↑		<ul style="list-style-type: none"> • Copyboard is at the reversal position. • Copyboard drive solenoid goes OFF. • After a specific period, copyboard drive solenoid goes ON. • Pick-up solenoid goes ON (continuous copying). 	 <p>Forward Q704:ON → OFF</p>
	↓	<ul style="list-style-type: none"> • For the last copy, the copyboard drive solenoid goes OFF at the copyboard home position. 	 <p>Reverse Q704:ON → OFF</p>

Table 3-2

2. Controlling the Copyboard Drive

The copyboard is controlled for forward, reverse, and stop operations by the copyboard drive solenoid (SL2) and forward/reverse switching mechanism.

A photosensor (Q704) is provided on the relay PCB to monitor the position of the copyboard; as the copyboard moves, the cam found under the copyboard pushes the copyboard sensor lever to turn the copyboard sensor ON or OFF.

'E2' is displayed if the copyboard fails to complete its movement within a specific period of time.

In response to the signal from Q704, the DC controller controls the timing for paper transport and the movement (forward, reverse, stop) of the copyboard; see Table 3-2.

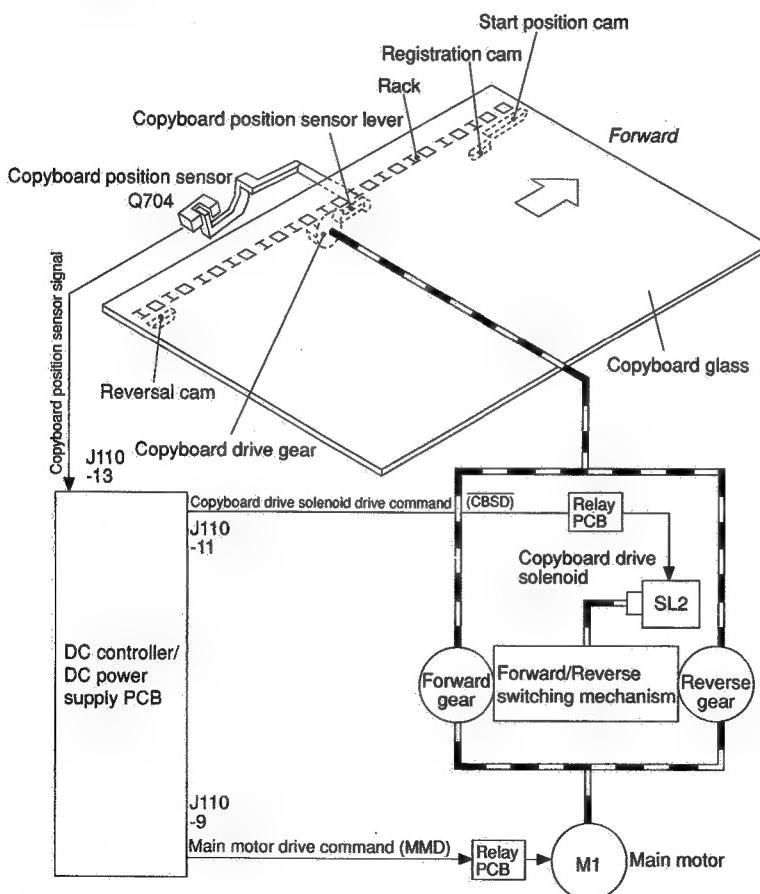


Figure 3-11 Front View

3. Mechanism of Copyboard Drive Assembly

The forward gear and reverse gear are rotating in the direction of the arrow (Figure 3-12) while the main motor (M1) is operating.

The forward/reverse switching mechanism engages with either the forward gear or the reverse gear depending on the orientation of the copyboard position sensor lever and the states (ON/OFF) of the copyboard drive solenoid (SL2) operated by the start position cam or reversal cam; when not engaged, the mechanism is said to be free, and the copyboard can be moved by hand.

The above mechanism is used to move the copyboard forward and reverse or to stop it.

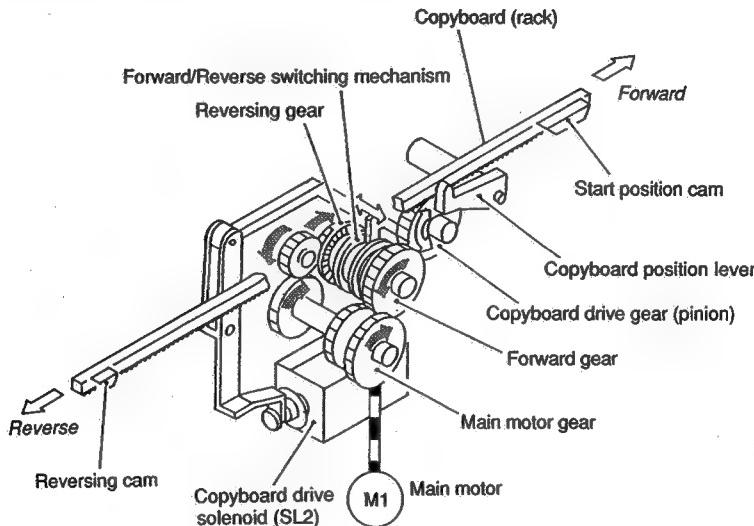


Figure 3-12

		Copyboard position sensor lever	
		Down	Up
Copyboard drive solenoid (SL2)	ON	forward	reverse
	OFF	stop (free)	

Note:

- i. The direction (forward/reverse) is switched when the copyboard drive solenoid is OFF.
- ii. The direction of the drive is maintained while the copyboard drive solenoid is ON.

Table 3-3

a. Stopping the Copyboard

Causing the copyboard drive solenoid (SL2) to go OFF frees both forward and reverse gears so that the copyboard remains stationary.

At the time, the copyboard may be moved to the right or left by hand.

b. Moving the Copyboard in Reverse

When SL2 goes ON while the main motor is operating, the forward/reverse switching mechanism engages with the reverse gear, and the reverse gear rotates in the direction of the arrow (Figure 3-13A), causing the copyboard to move in reverse.

The copyboard moves in reverse about two times as fast as when it moves forward owing to the difference in the gear ratio.

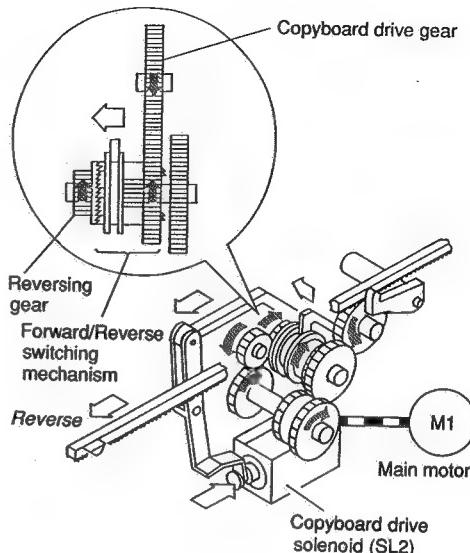


Figure 3-13A

c. Moving the Copyboard Forward

When the copyboard has moved in reverse and is positioned as shown in Figure 3-13B, the start position cam pushes down the copyboard position sensor lever. When SL2 goes ON in this position, the forward/reverse switching mechanism moves to the position shown in the figure, causing the forward/reverse switching mechanism to engage with the forward gear; as a result, the forward gear rotates in the direction of the arrow, moving the copyboard forward.

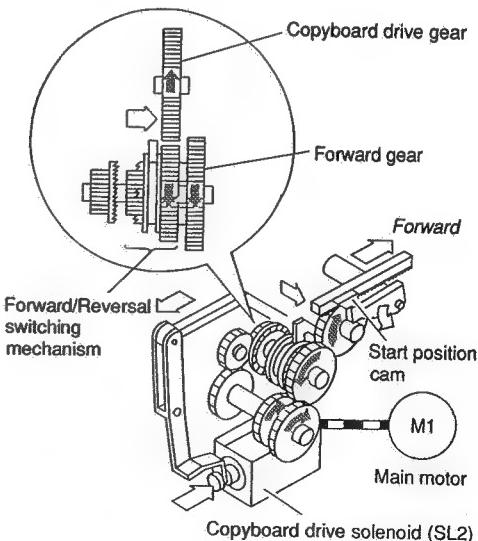


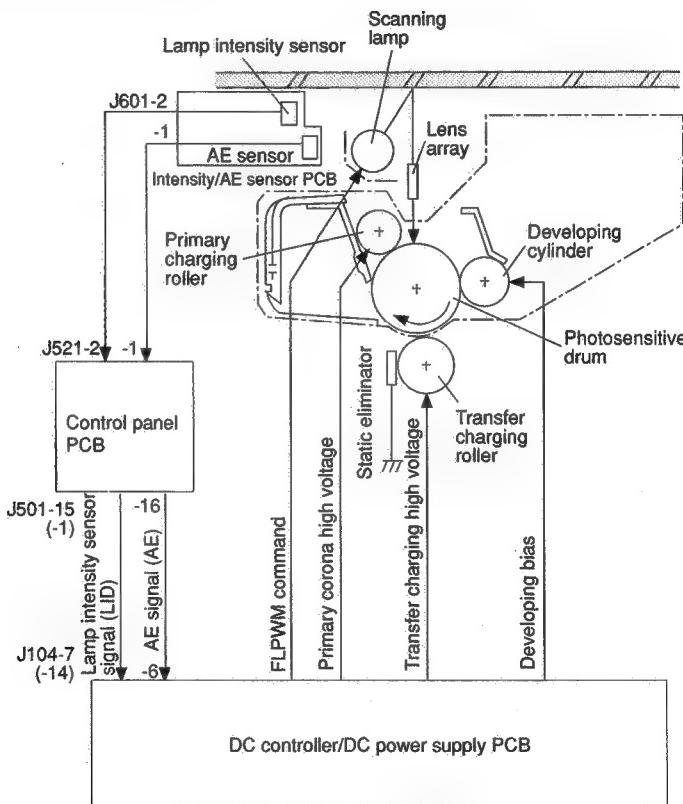
Figure 3-13B

III. IMAGE FORMATION SYSTEM

A. Outline

The copier's image formation system has the following functions:

- Controls the scanning lamp.
- Controls the primary charging.
- Controls the transfer charging.
- Controls the developing bias.



Note : The AE sensor is provided for the FC330 only;
the number within parentheses refers to the FC310.

Figure 3-14

B. Sequence of Image Formation Operations (A4, 2 copies)

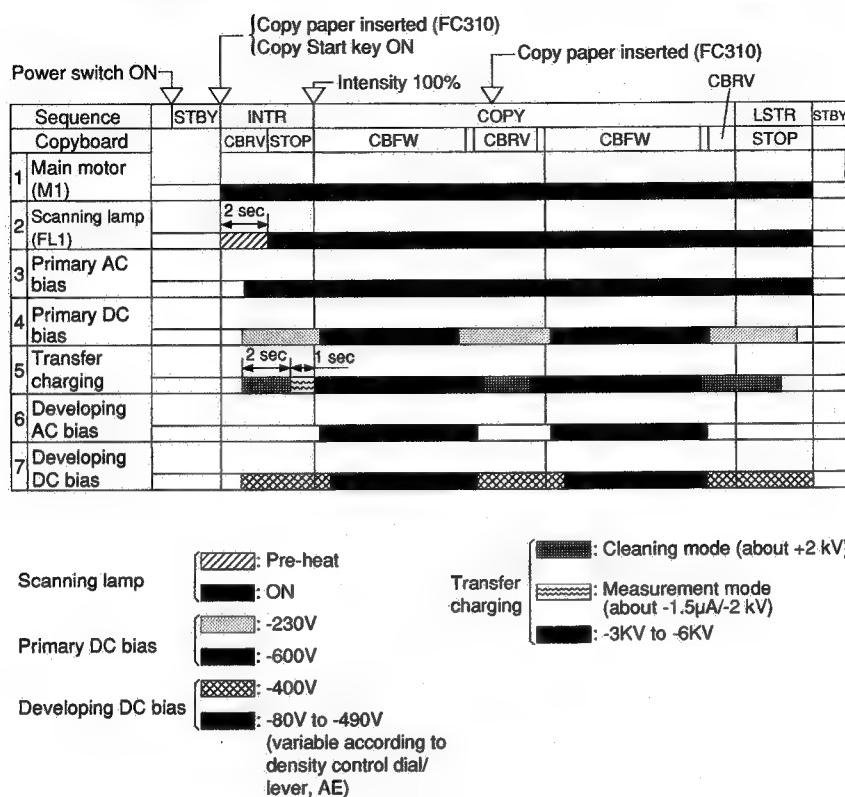


Figure 3-15

C. Primary Charging Control Circuit

1. Outline

Figure 3-16 shows the circuit that controls the primary charging, and the circuit has the following functions:

- Turns the DC bias ON and OFF.
- Turns the AC bias ON and OFF.
- Controls the DC bias voltage (constant).
- Controls the AC bias current (constant).

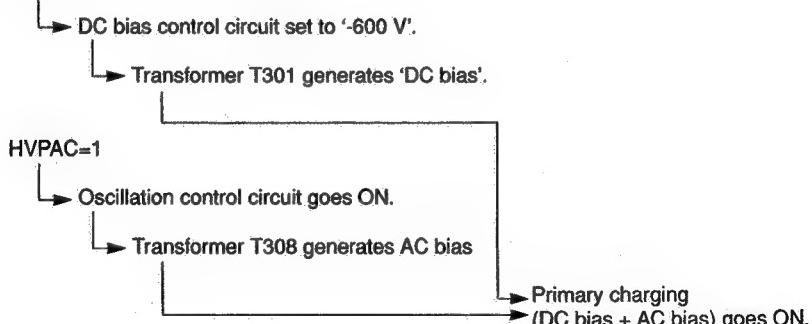
A DC bias (-600 V/-230 V) and an AC bias (485 μ A/about 1800 Vp-p, 400 Hz) are applied to the primary charging roller to maintain the surface potential of the photo-sensitive drum uniform.

During document exposure (-600 V) and non-exposure periods (-230 V) DC bias is switched by the DC bias high output command (HVPHO).

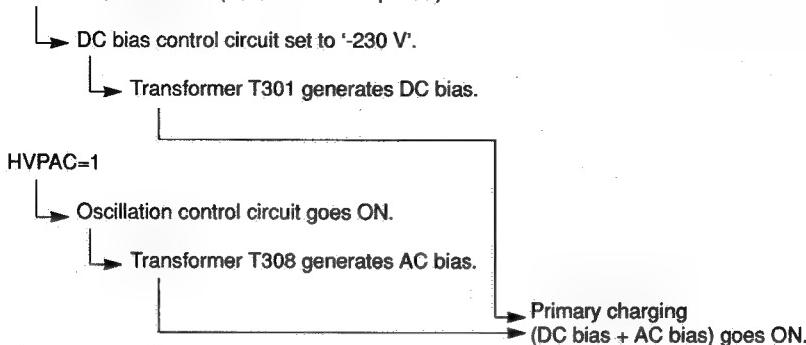
The DC bias and AC bias are turned ON and OFF by the DC bias ON command (HVPDC) and AC bias ON command (HVPAC), respectively.

2. Operations

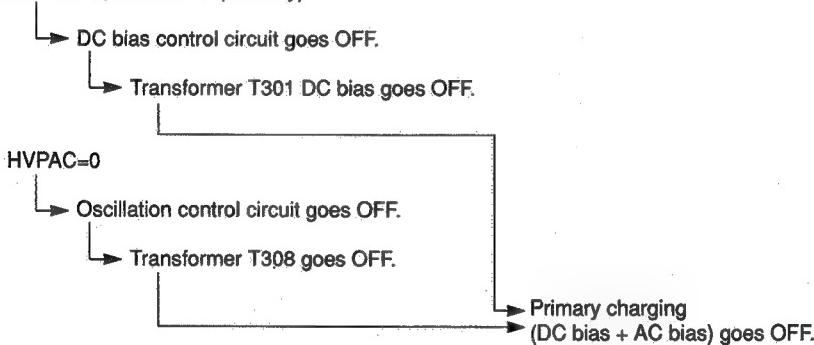
a. HVPDC=1, HVPHO=1 (copying)



- b. HVPDC=1, HVPHO=0 (document not exposed)



- c. HVPDC=0, HVPHO=0 (standby)



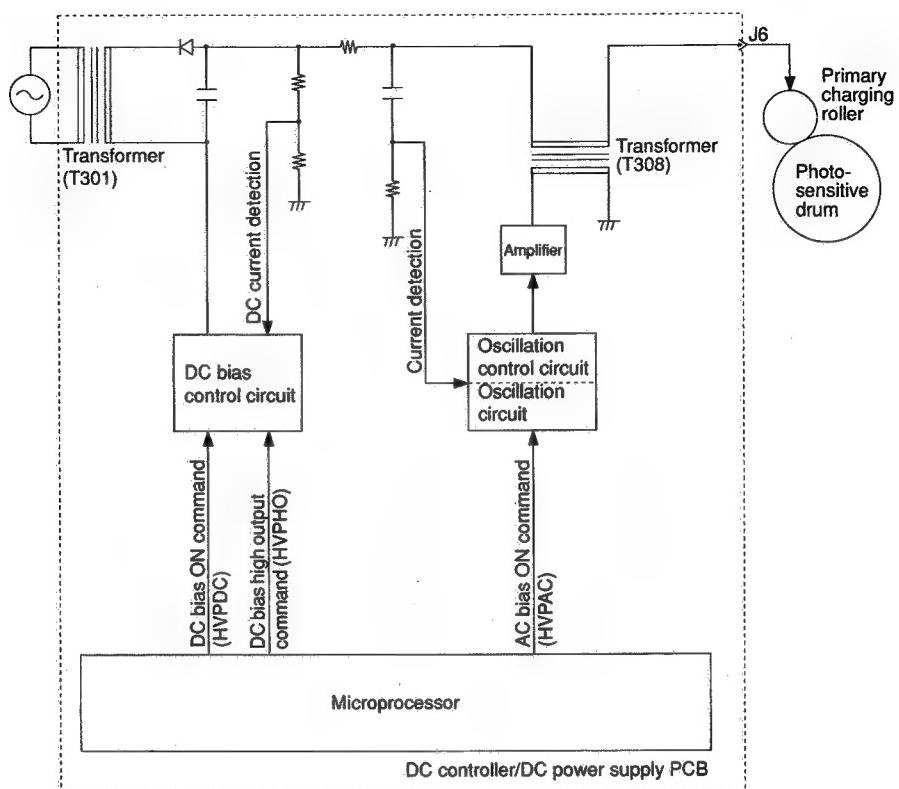


Figure 3-16

D. Controlling Developing Bias

1. Outline

Both AC bias and DC bias are applied to the developing cylinder during copying operation.

The AC bias is 1200 Vp-p, 1950 Hz at all times.

When the photosensitive drum is rotating except during development, about -400 V is applied to the developing cylinder regardless of the settings made by the density control dial/lever, thereby preventing adhesion of excess toner on the surface of the photosensitive drum.

The copier controls the copy density by varying the voltage of the DC component of the developing bias (-80 to -490 V) based on the following:

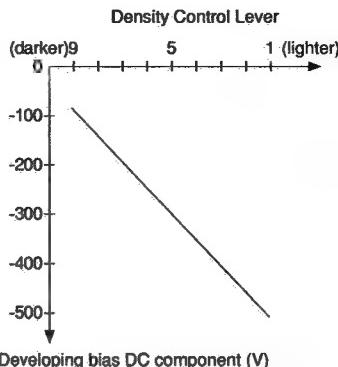
- Setting made by the density control dial/lever (manual density control).
- Output of the AE sensor (automatic density control; FC330).
- Setting made by the density correction switch (SW506; FC330).

The density correction switch (SW506) on the control panel PCB allows three settings by the user. Advise the user to change the setting if the copies tend to be foggy because of shifts in the sensitivity of the photosensitive drum. SW506 is valid for manual density control as well.

Figure 3-17 shows the changes in the DC component of the developing bias caused by the density control dial/lever in manual density control mode; Figure 3-18, on the other hand, shows changes in the DC component of the developing bias caused by different document densities in automatic density adjustment mode (AE).

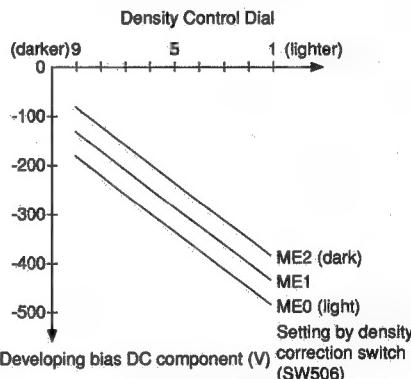
Note:

The copier does not change the developing bias between black toner and color toner. This is because the color toner used by the copier is a single-component agent, which allows the use of the same developing bias as for the black toner for development.



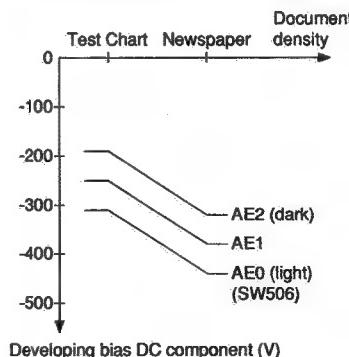
Developing bias DC component (V)

Figure 3-17A
Manual Density Control (FC310)



Developing bias DC component (V)
Setting by density correction switch (SW506)

Figure 3-17B
Manual Density Control (FC330)



Developing bias DC component (V)

Figure 3-18
Automatic Density Control (FC330)

2. Operations

Figure 3-19 shows the circuit that controls the developing bias, and the circuit has the following functions:

- Turns the developing bias AC component ON and OFF.
- Turns the developing bias DC component ON and OFF.
- Controls the voltage level of the DC bias according to the settings made by the copy density dial/lever.

a. Turning the Developing Bias AC Component ON and OFF

- $\text{ACBTP}=0$ (pulse output OFF)



T307 goes OFF.

The above condition deprives the developing cylinder of the AC bias.

- $\text{ACBTP}=1$ (pulse output ON)



T307 goes ON.

The above condition raises the AC bias output using the high-voltage transformer (T307) and sends it to the developing cylinder.

b. Turning the DC Bias ON and OFF and Controlling the Voltage Level

The DC bias is turned ON and OFF by the DC bias control command (DCBPWM).

The microprocessor checks the DC voltage when the DC bias is ON so as to keep it to the specified voltage.

a) DCBPWM=0 (DC bias OFF)



Q315 goes ON.



DC bias goes OFF.

b) DCBPWM=1 (DC bias ON)



Q315 goes OFF.



DC bias goes ON.

The voltage level of the DC bias is controlled by varying the pulse width of the DC bias control command (DCBPWM).

While the photosensitive drum is rotating except during development, about -400 V is applied to the developing cylinder.

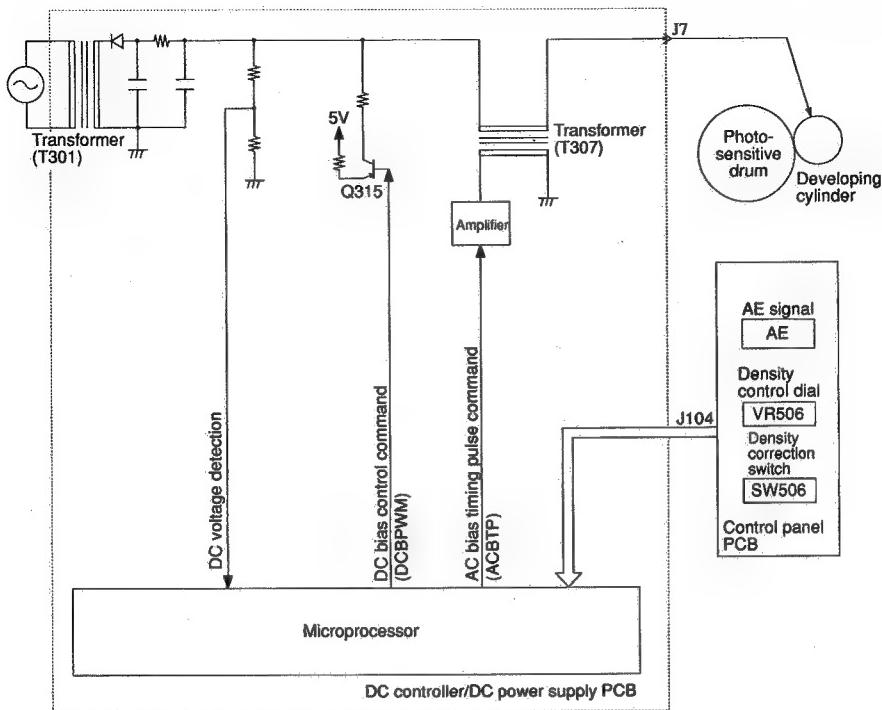


Figure 3-19

E. Transfer Charging Control Circuit

1. Outline

Figure 3-20 shows the circuit that controls transfer charging, and the circuit has the following functions:

- Controls the constant current in measurement mode.
- Controls the constant voltage of the DC bias.
- Switches the polarities of the DC bias (cleaning mode).

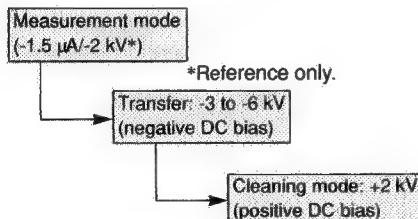
The internal resistance of the transfer corona roller tends to vary from one roller to another or because of changes in the environment.

The copier sends constant current (-1.5 μ A) to the transfer charging roller so that the microprocessor can check the changes in terms of voltage (measurement mode).

Based on the measured voltage, the microprocessor corrects the DC bias.

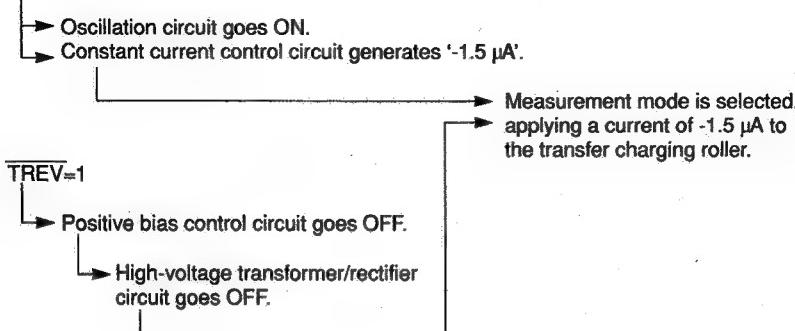
Further, the copier is equipped with a cleaning mechanism (cleaning mode) that prevents adhesion of toner to the transfer charging roller.

In cleaning mode while the drum is rotating, except during transfer, a DC bias is applied to the transfer charging roller with a reversed polarity, thereby returning the toner to the photosensitive drum.



2. Operations

a. Operations in Measurement Mode HVTDC=1, DCTPWM=0

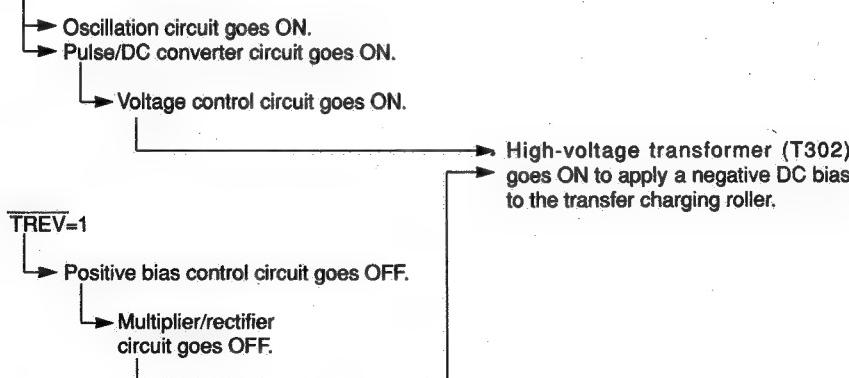


In measurement mode, the current is monitored by the current sensor circuit so that the constant current control circuit can control it to a constant current of -1.5 μA.

Further, the microprocessor monitors the internal resistance of the transfer charging roller in terms of voltage using the auxiliary winding of the transformer (T302).

b. Operations during Copying

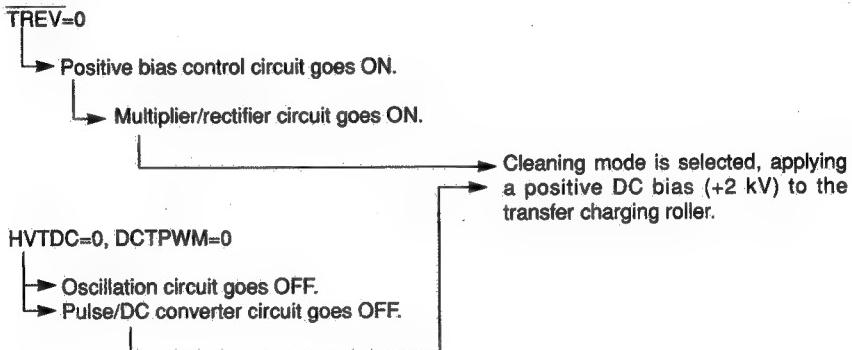
HVTDC=1, DCTPWM=1



The microprocessor varies the pulse width of the transfer DC bias control command (DCTPWM) according to the internal resistance of the transfer charging roller affected by the surrounding environment, thereby controlling the negative DC bias.

If an overcurrent occurs in the output side of the transformer (T302) because of changes in the environment, the current limiter circuit exerts control so that no current -5 μ A or more will flow.

c. Operations in Cleaning Mode



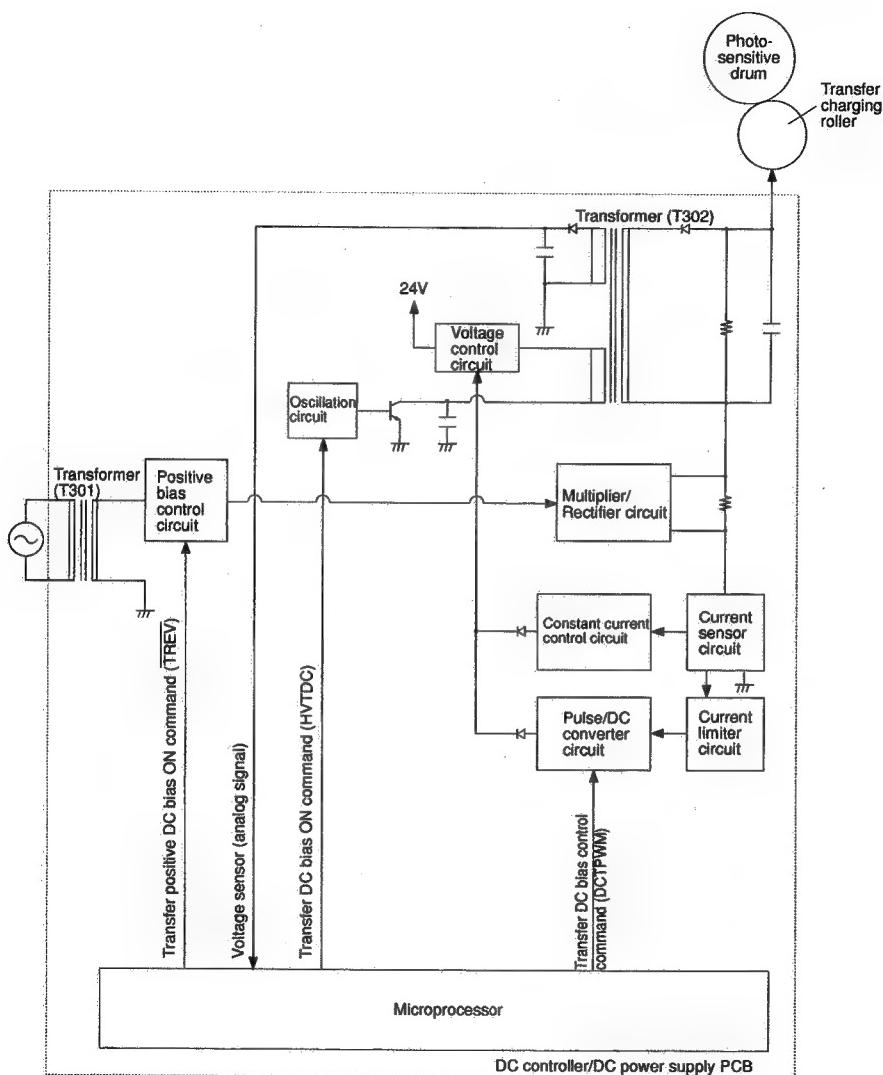


Figure 3-20

F. Document Density Measurement (AE; FC330)

1. Outline

The copier is equipped with an automatic density control (AE) mechanism that controls the DC component of the developing bias. The copier's AE mechanism does not execute an AE scan, but instead measures the document density during image exposure.

2. Operations

Document measurement is started while the copyboard is moving forward; i.e., when the leading edge of the document begins to be exposed (copyboard position sensor Q704 goes OFF).

At the time, the photodiode (PD602) on the intensity/AE sensor PCB checks the reflected light that is guided by the AE mirror.

The output of the photodiode (PD602) is amplified, and sent to the microprocessor as AE signals.

<AE Measurement Timing Chart>

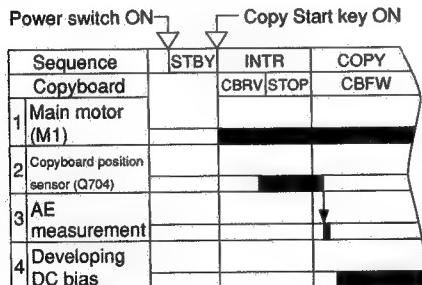
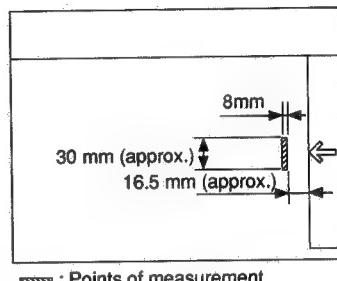


Figure 3-21

The microprocessor takes measurements of the AE signals three times every 30 milliseconds, and generates the developing DC bias control command (DCBPWM) to suit the average document density. See Figure 3-22 for the points at which the document density is measured in relation to the copyboard glass.



— : Points of measurement

Figure 3-22

3. Adjusting the AE Mechanism (VR101, VR102)

You must adjust the AE mechanism if you have replaced the scanning lamp, control panel PCB, or intensity/AE sensor PCB; see p. 3-50.

Note:

Adjust the AE mechanism only after adjusting the intensity of the scanning lamp.

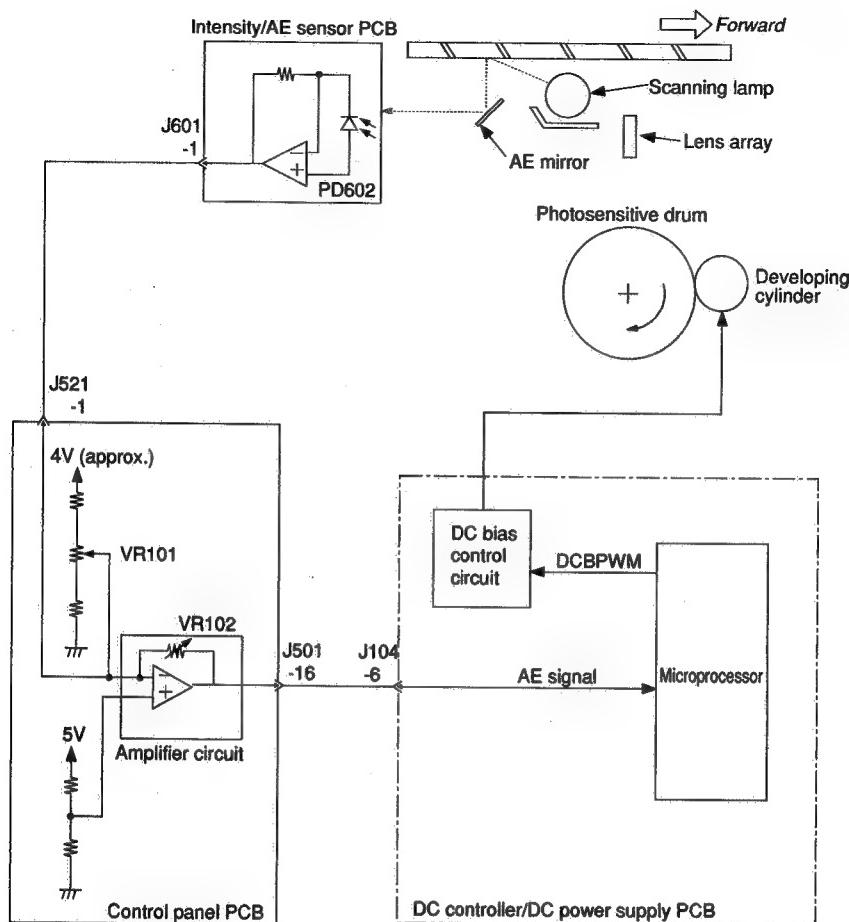


Figure 3-23

G. Controlling the Scanning Lamp

1. Outline

Figure 3-24 shows the circuit that controls the scanning lamp (fluorescent lamp: FL1), and the circuit has the following functions:

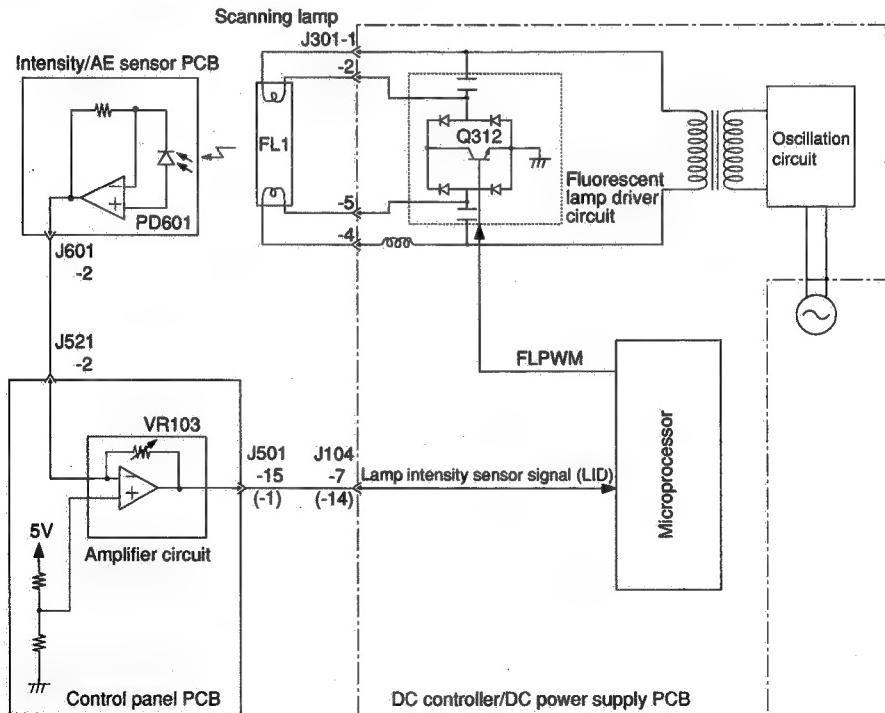
- Controls pre-heating of the scanning lamp.
- Turns the scanning lamp ON and OFF.
- Controls the intensity of the scanning lamp.

In general, if not controlled, fluorescent lamp grows brighter only gradually after it has gone ON.

In particular, in low ambient temperature, it takes longer before the lamp intensity becomes stabilized.

So that the document is exposed under a stable lamp intensity, the copier is equipped with an intensity sensor (PD601) on the intensity/AE sensor PCB.

The sensor monitors the intensity of the fluorescent lamp so that copying operation does not start until the intensity has reached a specific value.



The number within parentheses represents the FC310.

Figure 3-24

2. Operations**a. Controlling the Pre-heating of the Scanning Lamp**

- FLPWM =1

→ Q312 on the fluorescent lamp driver circuit goes ON.

→ Current of about 110 mA flows in the filament of the fluorescent lamp. (pre-heating starts)

b. Turning the Scanning Lamp ON and OFF

- Square waves of the FLPWM command corresponding to the output of the amplifier circuit are generated to the fluorescent lamp driver circuit.

→ Current of 150 mA flows into the filament of the fluorescent lamp, causing the fluorescent lamp to go ON at high frequency (150 kHz).

c. Controlling the Intensity of the Scanning Lamp

- If the intensity of the fluorescent lamp is low when the lamp goes ON,

→ Initial power of the intensity sensor PD601 is low.

→ Output voltage of the amplifier circuit is high.

→ Duty ratio of the output of the microprocessor (FLPWM command) grows low.

→ Current flowing to the fluorescent lamp increases.

- If the intensity of the fluorescent lamp is high when the lamp goes ON,

→ Initial power of the intensity sensor PD601 is high.

→ Output voltage of the amplifier circuit is low.

→ Duty ratio of the output of the microprocessor (FLPWM command) grows high.

→ Current flowing to the fluorescent lamp decreases.

(When the intensity is stable, the filament current is about 80 mA.)

- If it takes the intensity of the fluorescent lamp too long to stabilize, the microprocessor activates the internal timer until the intensity becomes stable after the Copy Start key has been pressed.

If the intensity is below the specified value when the timer advances to 45 seconds, self diagnosis is activated, indicating 'E6' for the FC330, and keeping the Jam Indicator ON for the FC310.

3. Controlling the Intensity of the Scanning Lamp (VR103)

You must adjust the intensity of the fluorescent lamp if you have replaced the intensity/AE sensor PCB or control panel PCB; see p. 3-49.

Note:

You must adjust the AE mechanism after adjusting the intensity.

IV. PICK-UP/FEEDING SYSTEM

A. Outline

The pick-up roller starts to rotate when the pick-up solenoid goes ON (SL1; FC330), or when pick-up sensor goes ON (Q119; FC310), thereby moving the copy paper from the tray to the registration roller.

The copy paper is controlled by the registration roller so that its leading edge matches that of the image on the photosensitive drum; the paper is then moved to the transfer, separation, feeding, and fixing assemblies before it reaches the copy tray.

The delivery of copy paper is monitored by the delivery sensor (Q801); if copy paper fails to reach or move past the sensor, the copier identifies the condition as a jam and flashes 'Jam' on the control panel.

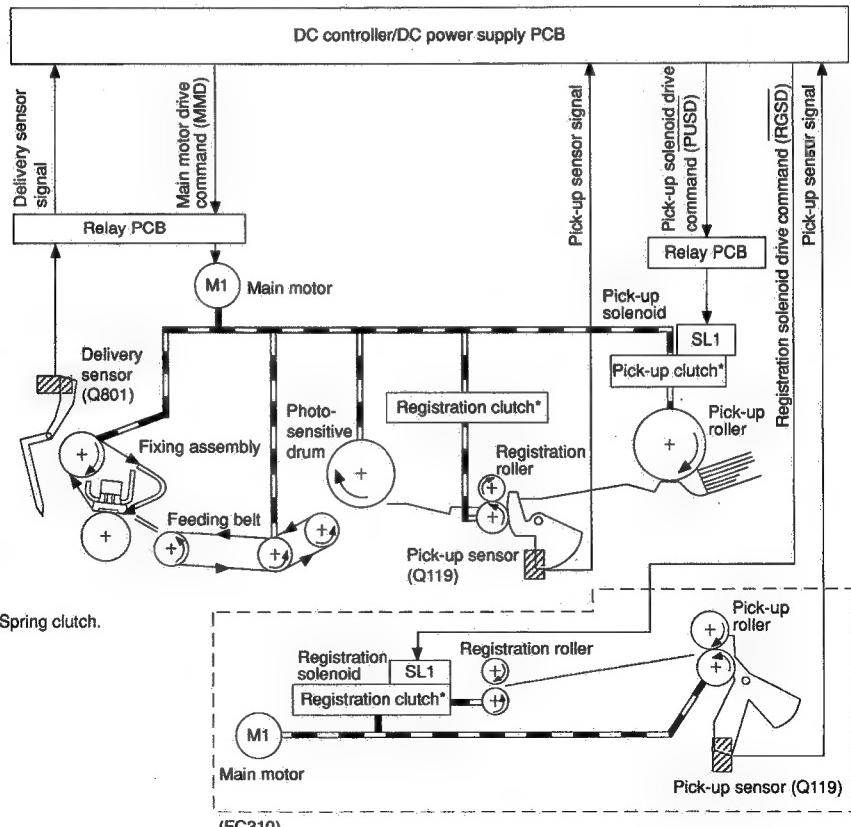


Figure 3-25

B. Controlling the Pick-Up Roller

1. FC330

The pick-up roller is controlled by a spring clutch, control ring, and pick-up solenoid (SL1).

When the pick-up solenoid goes ON, the claw moves away from the control ring, allowing the drive from the main motor (M1) to be transmitted, causing the pick-up roller to make a single rotation.

At the time, copy paper is picked up and butted against the registration roller, forming an arch.

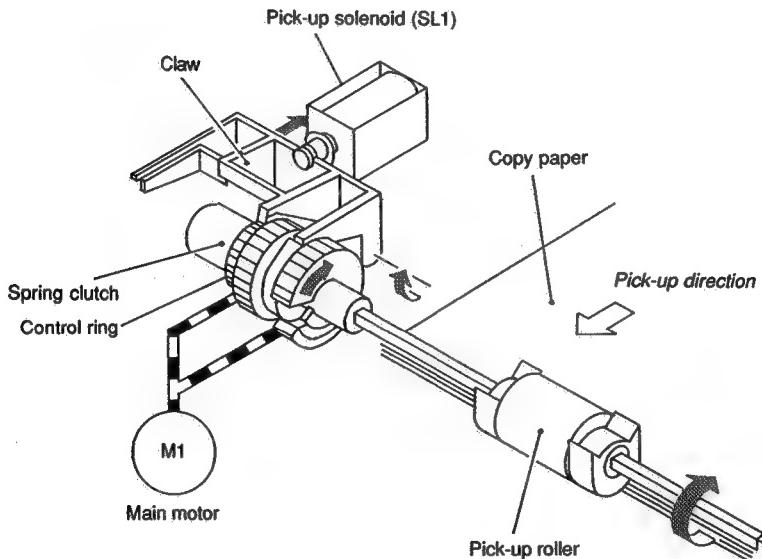


Figure 3-26

2. FC310

When the pick-up sensor (Q119) detects copy paper, the main motor (M1) goes ON, causing the pick-up roller to rotate by its drive.

The pick-up roller keeps rotating as long as the main motor remains ON.

The condition causes the copy paper to butt against the registration roller.

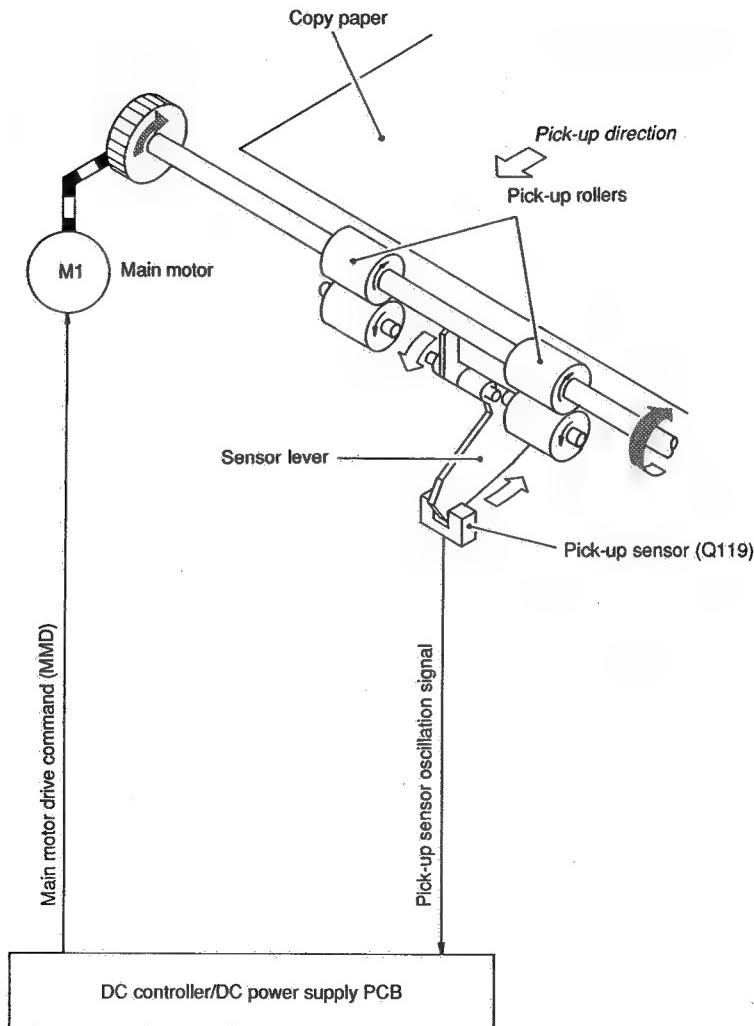


Figure 3-27

3. Controlling the Registration Roller

The registration roller rotates when the registration cam found under the copyboard glass pushes the lever* while the copyboard is moving forward; see Table 3-2 and Figure 3-28.

*Frees the claw that holds the control ring.

The registration roller stops when the pick-up solenoid (FC330) or the registration solenoid (FC310) goes ON to set the claw to the control ring.

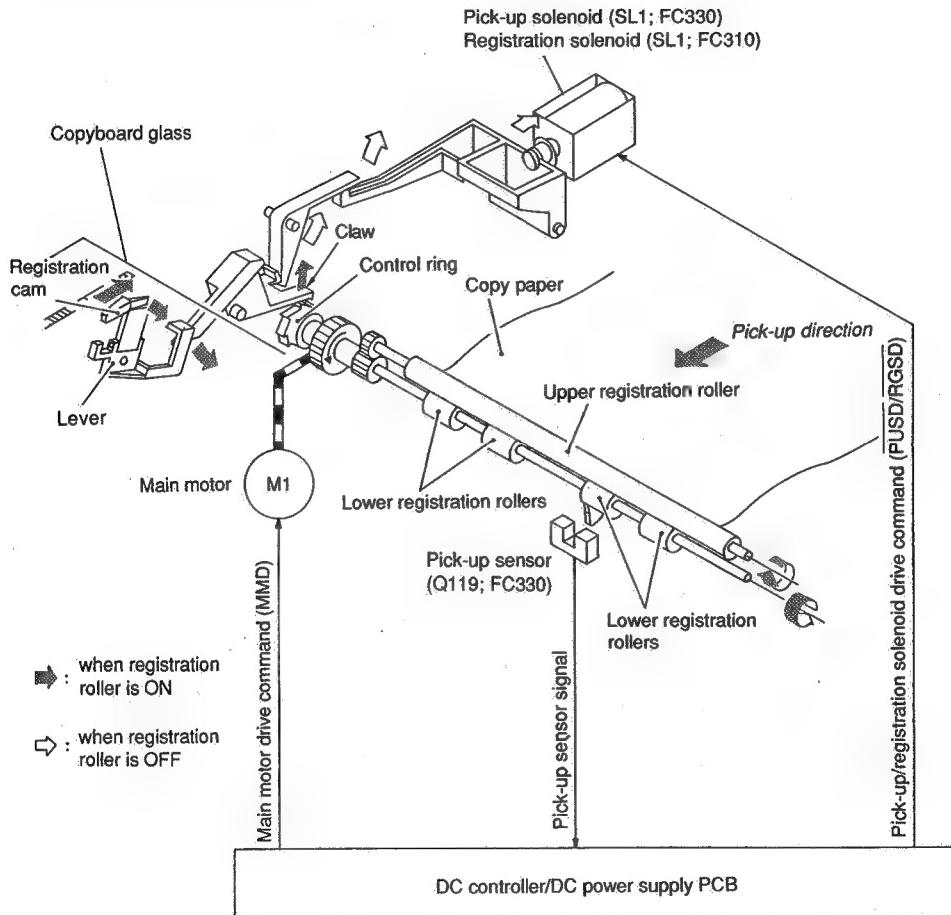


Figure 3-28

4. Pick-Up/Feeding Timing Chart (A4, 2 copies)
 a. FC330

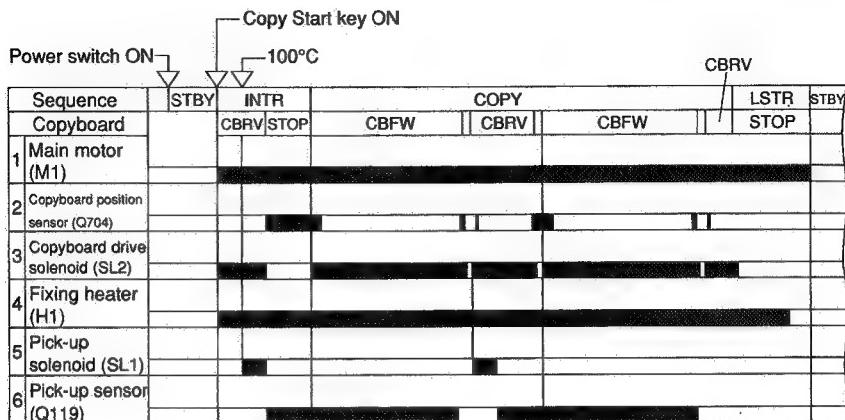


Figure 3-29A

b. FC310

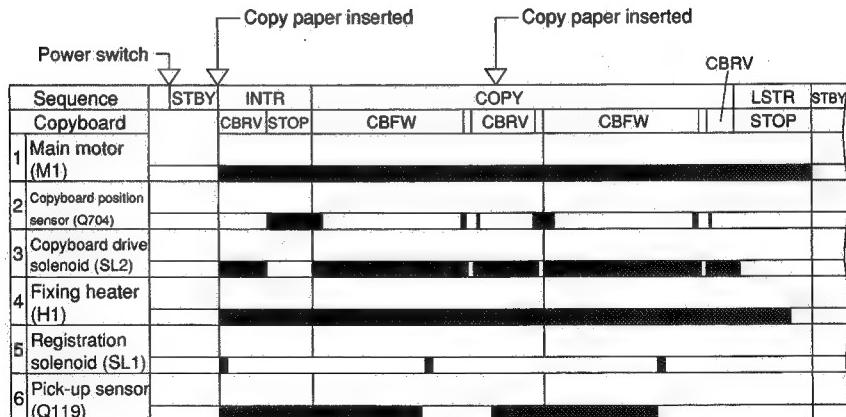


Figure 3-29B

D. Fixing/Delivery Assembly

1. Outline

The drive roller in the fixing assembly is driven by the main motor (M1).

The rotation of the drive roller causes the fixing film and then the pressure roller to rotate.

Some sections of the underside of the fixing film is heated by the fixing heater.

The temperature of the fixing heater is monitored by the thermistor (TH1), and the readings are sent to the microprocessor on the DC controller/DC power supply circuit in the form of the fixing heater temperature sensor signal (TH1).

Based on the signal, the microprocessor of the DC controller/DC power supply circuit controls the temperature of the fixing heater by the fixing heater drive command (HTRD).

The rear end of the fixing heater is also equipped with a thermistor (TH2) to check overheating.

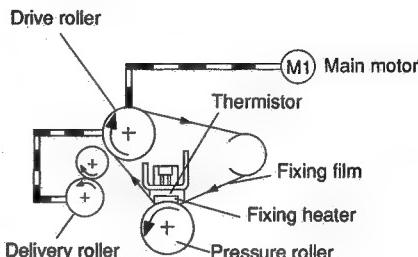


Figure 3-31

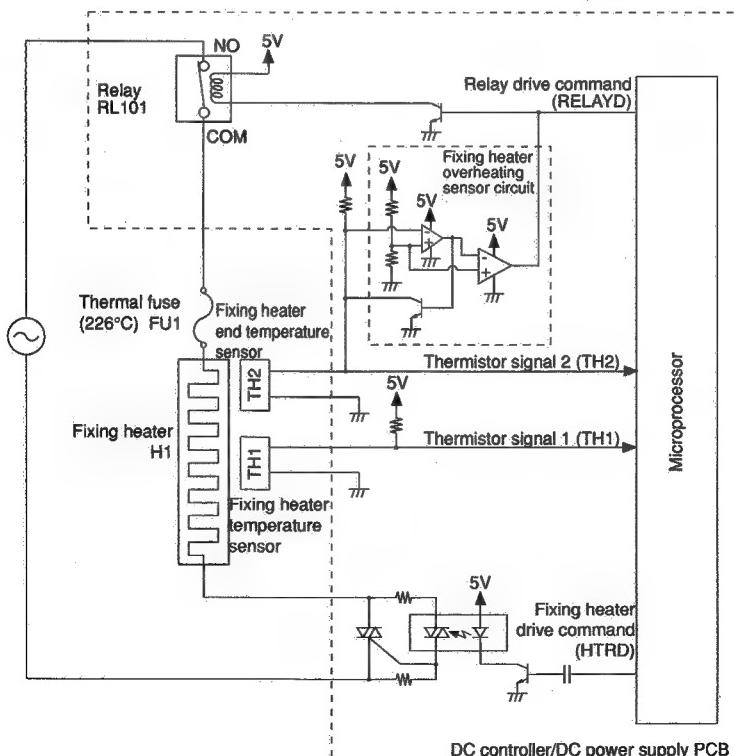


Figure 3-30

2. Controlling the Fixing Heater Temperature

The target temperature for the fixing heater is controlled to three settings (170°, 180°, 185°C) by the microprocessor based on the following conditions:

- Temperature of the fixing heater at power-on.
- Temperature of the fixing heater at the beginning of copying operation.
- How many copies have been made.

3. Controlling the Supply Power to the Fixing Heater

The temperature of the fixing heater (H_1) is controlled by controlling the power supplied to the fixing heater.

The power to the fixing heater is controlled by a phase power control method.

The microprocessor on the DC controller/DC power supply circuit takes on the zero-cross signal (ZXDP) from the zero-cross signal generator circuit as a sync signal to identify the AC input voltage in relation to the reference voltage signal (VPEAK) from the reference voltage sensor circuit.

Using the reading, the microprocessor controls the fixing heater drive command (HTRD) power to attain the specific target temperature for the fixing heater, in other words exerting phase control on the supply power to the fixing heater.

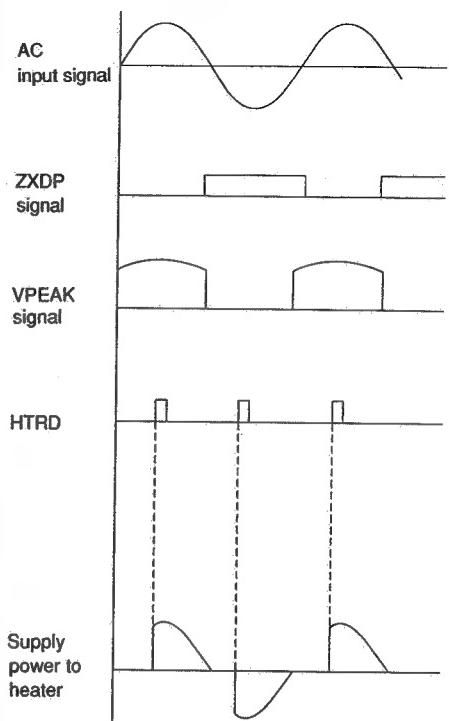


Figure 3-33

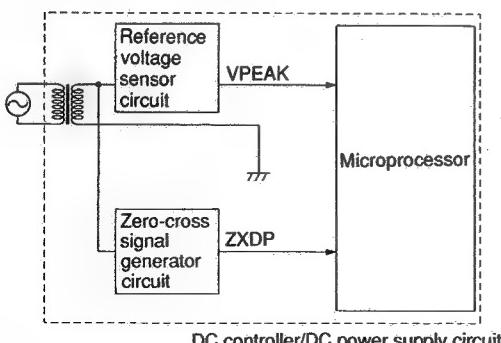


Figure 3-32

4. Correcting Displacement of the Fixing Film

The fixing film can at times become displaced toward the front or rear as it continues to rotate.

A rib is provided in front of the film, and a correction lever is provided as if to sandwich the rib; see Figure 3-34.

When the fixing film becomes displaced, the correction lever operates to raise or lower one side of the drive roller. The condition causes the fixing film to move askew in the opposite direction, thereby correcting the displacement.

Figures 3-35, -36, and -37 are an outline of the correction mechanism; i.e., the relationship between the fixing film displacement sensor and the movement of the drive roller.

The correction lever is equipped with a lever for the fixing film displacement sensor.

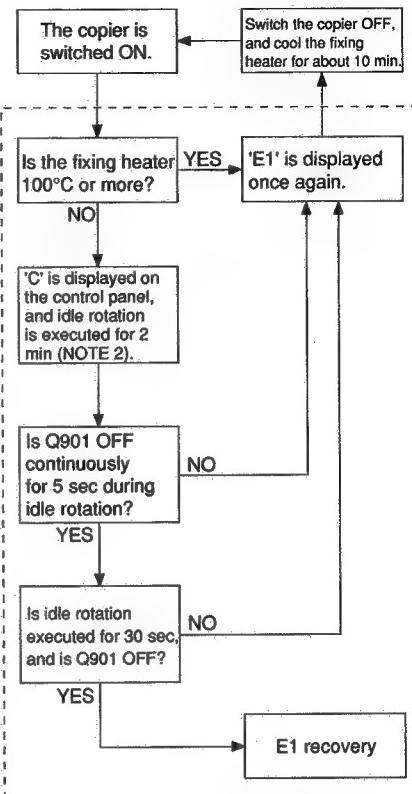
Normally, the fixing film displacement sensor (Q901) remains OFF (sensor lever at Q901), and it goes ON when the fixing film starts to move askew.

If the microprocessor learns that Q901 has gone ON under the following conditions, it indicates 'E1' (Jam indicator if FC310) on the control panel.

- The temperature of the fixing heater as checked by TH1 is 100°C or more at power-on.
- Q901 is identified as being ON continuously for about 5 seconds during copying operation.

The copier enters E1 recovery mode automatically in response to power-on when an 'E1' condition exists.

<E1 Recovery Flow Chart>



NOTE 1: Operations within dashed lines are executed by the microprocessor automatically.

NOTE 2: For FC310, the Main indicator flashes.

Note:

If 'E1' is still displayed after two attempts at E1 recovery mode, the fixing assembly or fixing film displacement sensor (Q901) may be faulty; make checks.

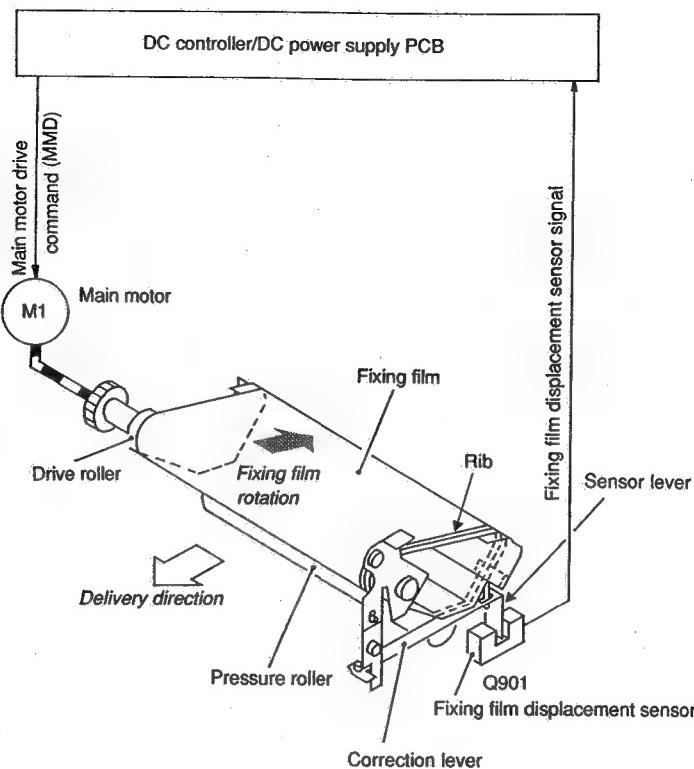


Figure 3-34

- a. When the fixing film becomes displaced toward the rear, the front side of the drive roller is pushed down to the left to bring the film back to the front side.

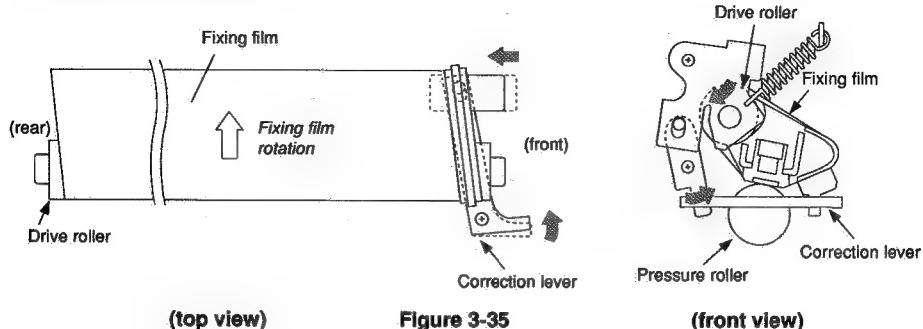


Figure 3-35

- b. When the fixing film is at the center,

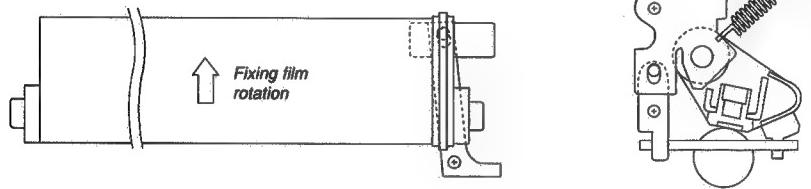


Figure 3-36

- c. When the fixing film becomes displaced toward the front, the front side of the drive roller is pulled up to the right to bring the film back to the rear side.

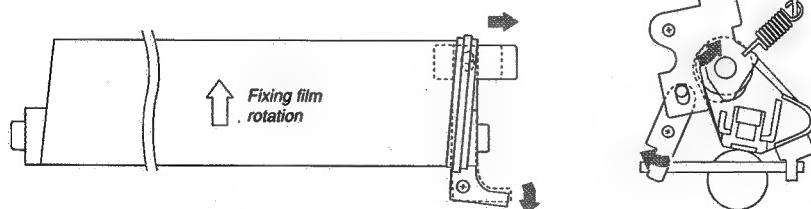


Figure 3-37

The fixing film position is controlled by executing the above operations as necessary.

5. Correcting the Variation in Resistance of the Fixing Heater

The resistance of the plane heater used as the fixing heater is subject to variation attributed to manufacturing processes. To counter this, the microprocessor takes four different readings of the resistance for control.

Note:

The four readings of the fixing heater are determined by the combination of jumper wires fitted to the connector assembly of the thermistor (TH1); see Figure 3-38.

These settings are made when the fixing assembly is put together at the factory; do not reposition the wires in the field.

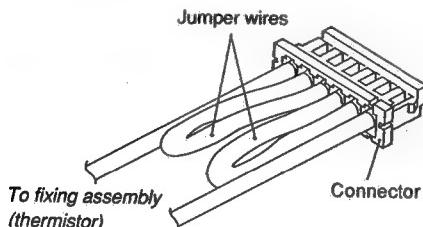


Figure 3-38

6. Checking Overheating of the End of the Fixing Heater

A thermistor (TH2) is attached to the rear end of the fixing heater to monitor overheating.

The area is monitored because making small-size copies (postcards) continuously is likely to overheat the area, possibly damaging the fixing film.

When the thermistor (TH2) registers 245°C, 'H' is indicated on the control panel (for FC310, the Main indicator flashes), and copying operation is suspended after discharging the ongoing copy.

Presses on the Copy Start key are not accepted while the thermistor is registering 245°C.

'H' disappears when the temperature of the fixing heater lowers and, as a result, the thermistor stops registering 245°C; thereafter, a press on the Copy Start key resumes copying operation for the remaining number of copies. (In the case of the FC310, the Main indicator remains ON to indicate copy-ing is ready.)

7. Protection Mechanisms

The copier is equipped with the following protection mechanisms to prevent malfunction of the fixing heater.

- a. The microprocessor monitors the voltage of TH1, and displays 'E0' (FC330)/'Jam' (FC310) and turns the power off upon detection of any of the following conditions:
 - i. The temperature of the fixing heater does not reach 80°C 2.5 sec after copying starts.
 - ii. The temperature of the fixing heater does not reach 150°C within 7.5 sec after copying starts.
 - iii. The temperature of the fixing heater drops to 135°C or less after it has reached 150°C.
 - iv. The temperature of the fixing heater rises in excess of 215°C.
- b. The maximum power (470 W) is detected for 5 sec continuously after the temperature of the fixing heater has reached 150°C.
- c. TH2 registers 255°C as the temperature of the fixing heater; as a result, the fixing heater error temperature detection circuit causes RELAYD to go '0' and the relay (RL101) to go OFF, thereby cutting the power to the fixing heater.
- d. The thermal fuse (FU1) blows after it has reached 226°C and a specific time has passed to cut off the power to the fixing heater.

E. Checking for Jams

The copier has a pick-up sensor (Q119) and a delivery sensor (Q801) to check if the paper is moving properly inside it; see Figure 3-25.

Jams are identified by the presence of paper in the pick-up or delivery assembly at such times as preprogrammed in the microprocessor.

When the microprocessor identifies a jam, it immediately causes the main motor to go OFF and indicates the presence of a jam.

The microprocessor identifies the following conditions as jams.

1. Delivery Delay Jam

The copy paper does not reach the delivery sensor within a specific period of time.

a. FC330

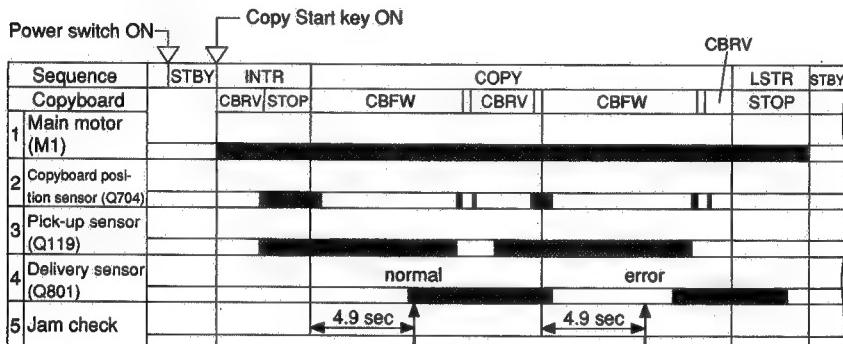


Figure 3-39A (A4)

b. FC310

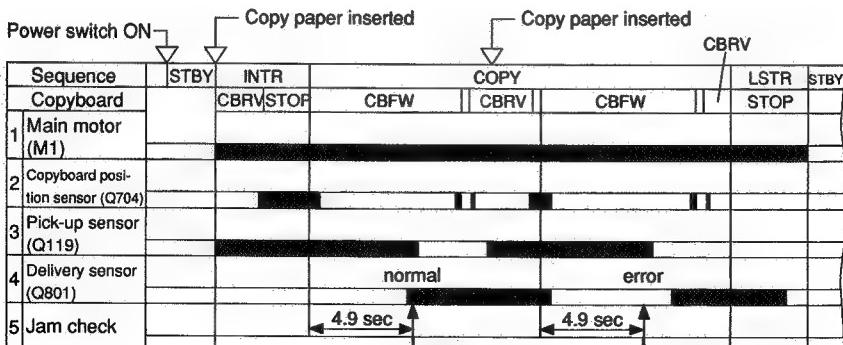


Figure 3-39B (A4)

2. Delivery Stationary Jam

The copy paper does not move past the delivery sensor within a specific period of time.

a. FC330

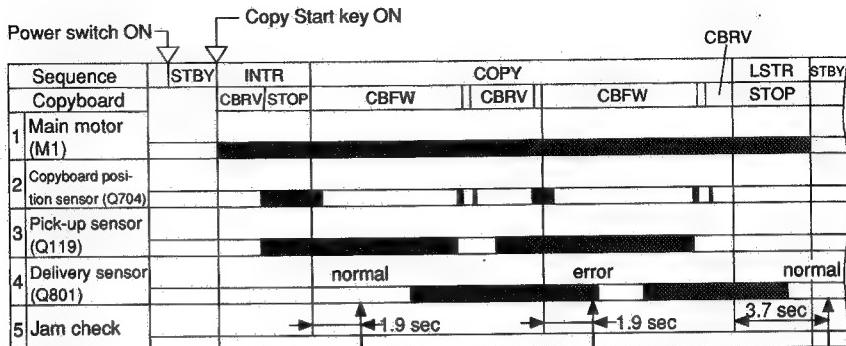


Figure 3-40A (A4)

b. FC310

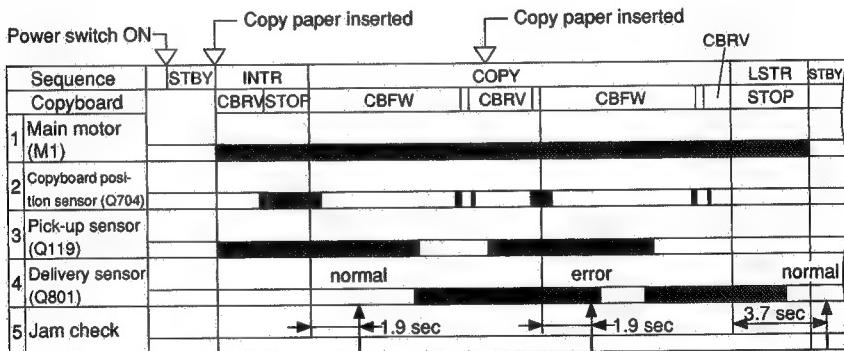
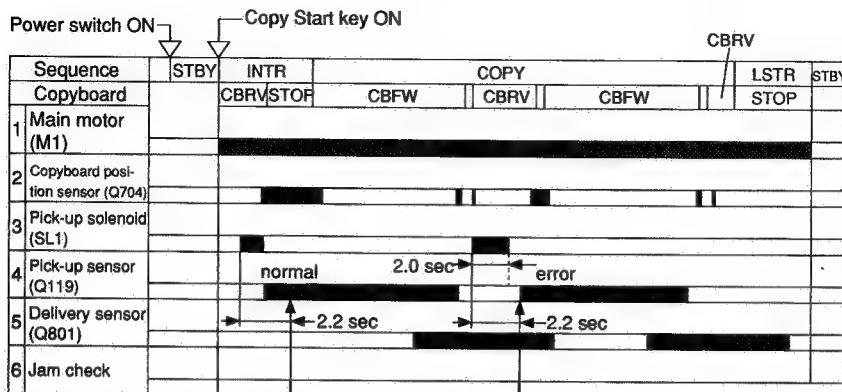


Figure 3-40B (A4)

3. Pick-Up Delay Jam (FC330)

The copy paper does not reach the pick-up sensor within a specific period of time.



Note: A jam is identified if the pick-up sensor is ON 0.2 sec after the pick-up solenoid has gone OFF.

Figure 3-41

4. Pick-Up Stationary Jam

The copy paper does not move past the pick-up sensor within a specific period of time.

a. FC330

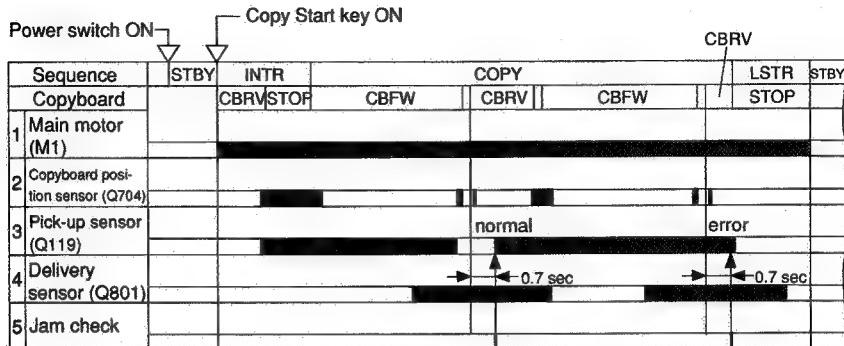


Figure 3-42A (A4)

b. FC310

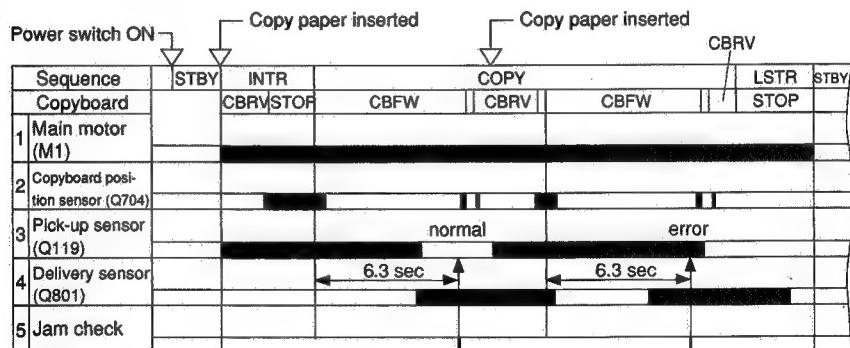


Figure 3-42B (A4)

- Paper is present at the pick-up or delivery sensor at time of power-on or when the Copy Start key is pressed.

V. POWER SUPPLY

A. Outline

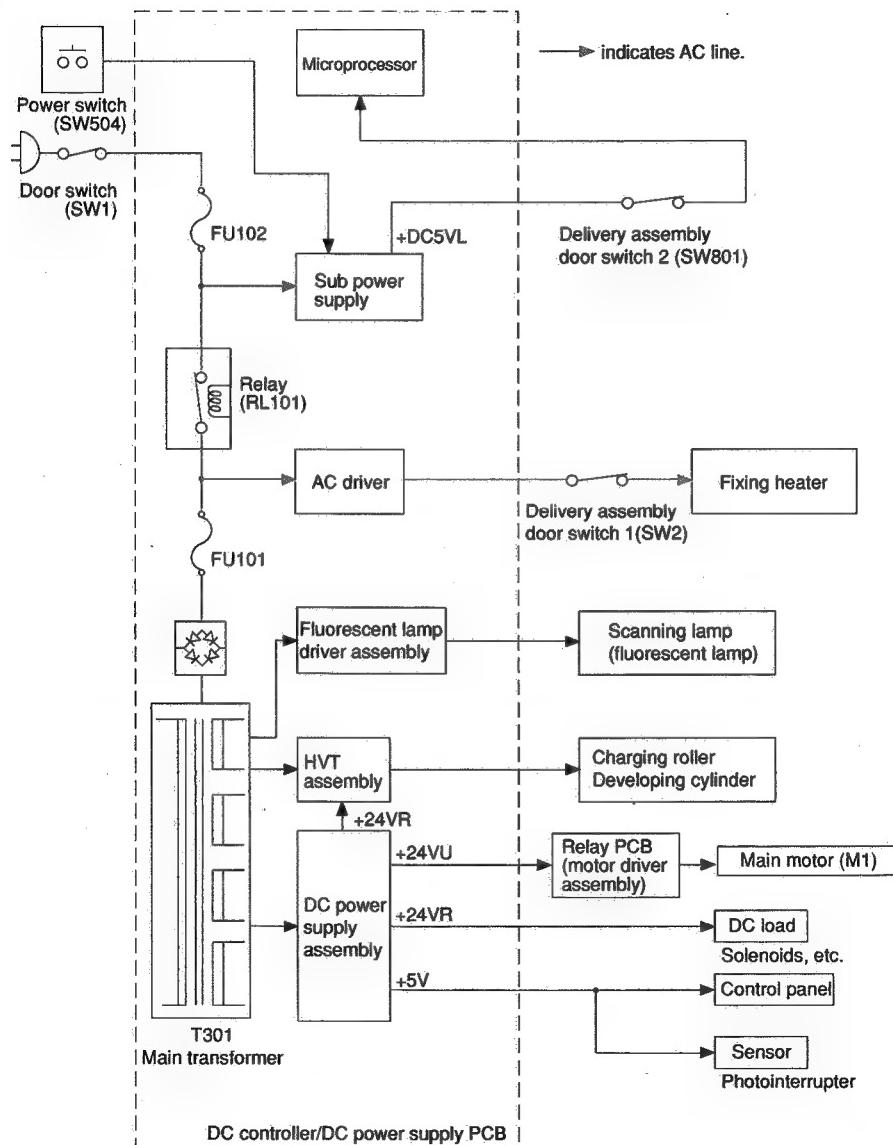


Figure 3-43

B. Power Supply PCB

The copier's power supply is a composite power supply in which one main transformer (T301) supplies DC power as well as power for high voltage and fluorescent lamp.

AC power is supplied to the DC power supply when the power switch and door switch are turned ON.

The DC power supply generates +24 V and +5 V.

For auto power-off, the microprocessor causes the relay (RL101) to go OFF, thus cutting power supply.

The copier is equipped with a sub power supply which provides the microprocessor with +5VDCL power for about 5.5 minutes after a condition associated 'E0' occurs; during this period, the copier is prevented from going ON to prevent damage by overheating the fixing heater.

Note:

The tolerances for the DC power supply are as follows:

- +24VR ± 5%
- +24 VU : +22 V to +46 V
- +5 VL ± 2%
- +5 V ± 10%

C. Protection Mechanism for Power Supply Circuit

The DC power supply circuit's AC power supply input is equipped with a fuse. The fuse blows if an overcurrent flows because of a short circuit in the 24V power, thus shutting out the output from the AC power supply circuit. If this happens, disconnect the copier's power cord, correct the cause of the problem, and replace the fuse.

If the microprocessor detects an error on the AC or 24VDC line of the main transformer (T301), it causes the relay to go OFF, thus cutting the power output. If this happens, remove the cause and switch the copier ON to reset.

VI. STANDARDS AND ADJUSTMENTS

- Image Leading Edge Non-Image Width (position of white paint on back of glass)**
The leading edge non-image width must be 2.0 ± 1.0 mm when the Test Sheet is copied.



Figure 3-44

The leading edge non-image width is determined by the position of the white paint found behind the copyboard glass.

- Image Leading Edge Margin (point of detection for registration)**
The leading edge margin must be 0.2 to 5.0 mm when the Test Sheet is copied.
To adjust, move the position of the registration cam.

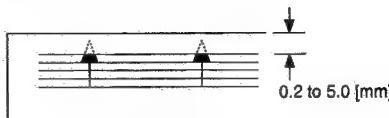


Figure 3-46

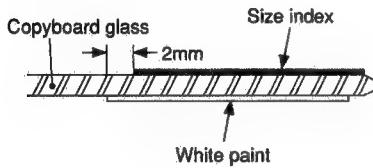


Figure 3-45

B. Electrical

Note:

If you have replaced the scanning lamp, intensity/AE sensor PCB, or control panel PCB, you must adjust the three variable resistors on the control panel PCB (one, if FC310); you must, however, adjust them in the order of VR103, VR101, and VR102 (from intensity to AE).

1. Adjusting the Intensity (VR103)

- a. After Replacing the Control Panel PCB Only
- 1) Disconnect the power plug, and detach the faulty control panel PCB.
- 2) Set the meter to the '20 kΩ' range, and measure C between terminal of VR103 and terminal of R505 on the detached control panel PCB; see Figure 3-47A.
- 3) Likewise, measure C between terminal of VR103 and terminal of R505 on the new control PCB; then, turn VR103 so that the reading is the same as the measurement taken in step 2).
- 4) In the case of the FC330, adjust VR101 (A between terminal of VR101 and terminal of R508) and VR102 (B between terminal of VR102 and terminal of R507); see Figure 3-47A.
- 5) Attach the new control panel PCB to the copier.

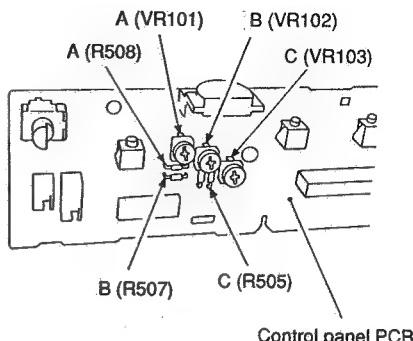


Figure 3-47A (FC330)

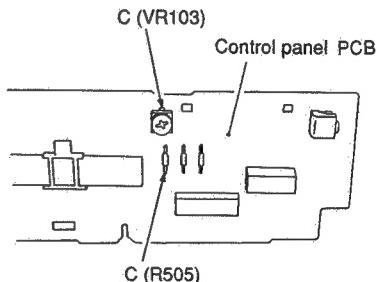


Figure 3-47B (FC310)

b. After Replacing the Scanning Lamp or Intensity/AE Sensor PCB

(Before Adjustment)

- If the scanning lamp (fluorescent) has blackened, replace it.
 - Clean the scanning system (lens array, lamp reflector, lamp).
- 1) Set the cartridge to the copier.
 - 2) Deselect AE, and set the copy density control lever/dial to the center.
 - 3) Set the density correction switch (SW506) to the center (FC330).
 - 4) Set the Test Sheet (NB3/NA2), and make a copy.
 - 5) Check if the copy is free of fogging, and gray scale No. 10 is barely visible.

- If too dark,
Turn VR103 on the control panel PCB clockwise slightly to increase the intensity.
 - If too light,
Turn VR103 counterclockwise slightly to decrease the intensity.
- 7) Repeat steps 4) and 5) until the density is optimum.

Note:

After adjusting the intensity, be sure to adjust the AE mechanism (FC330).

2. Adjusting the AE Mechanism (VR101, VR102)

(Before Adjustment)

- Obtain a newspaper whose text consists of fine print; do not use a section with photos or large characters.
- Make sure you have adjusted light intensity.

- 1) Switch the copier OFF.
- 2) Detach the control panel cover.
- 3) Turn VR101 and VR102 on the control panel PCB fully clockwise.
- 4) Place a newspaper over the AE light-receiving section of the copyboard, and close the copyboard cover.

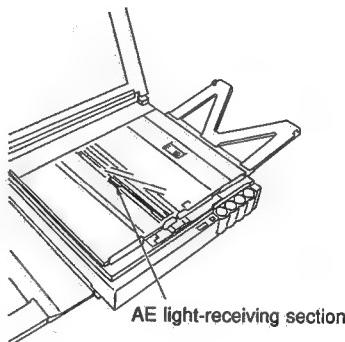


Figure 3-48

- 5) Short the three jumper wires (JP532, JP533, JP534) on the control panel PCB using a screwdriver at the same time.

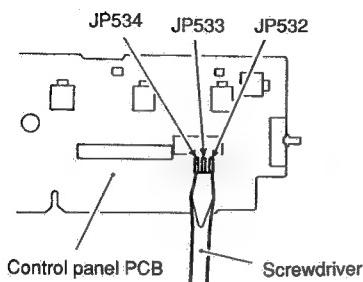


Figure 3-49

- 6) While keeping the condition in step 5), switch the copier ON.

- 'F' is displayed, the scanning lamp goes ON, and the main motor starts to rotate.
- After about 6 seconds, '0', '1', or '2' is displayed.

- 7) Stop shorting the jumper wires.
 8) Turn VR101 (AE offset adjustment) so that the '0' and '1' alternate rapidly.
 9) Place about five sheets of blank copy paper.
 10) Turn VR102 (AE gain adjustment) so that '1' and '2' alternate rapidly.
 11) Switch the copier OFF.

Note:

Make sure that the jumping wires are no longer shorted.

- 12) Switch the copier ON once again.

- 13) Set the density correction switch (SW 506) to the center (of the three settings).
 14) Make sure that the AE indicator is ON.
 15) Set the newspaper used in step 4) on the copyboard once again; this time, move the newspaper to a different area.

- 16) Make a copy, and make sure that it is not foggy and has adequate text density.

- If foggy,
Turn VR101 clockwise slightly.
- If text density is low,
Turn VR101 counterclockwise slightly.

- 17) Repeat steps 15) and 16) until the density is optimum.

VII. SELF DIAGNOSIS

The copier's microprocessor on the DC controller/DC power supply PCB is equipped with a self diagnostic mechanism that checks the condition of the machine; when the mechanism detects an error, it indicates an error code on the copy count display.

(The FC310 does not have a copy count display; it indicates an error condition by flashing the Jam indicator.)

'E1' is represented by alternating
E ↔ I.

Code	Cause	Description
E0 (Note)	<ul style="list-style-type: none"> • Thermistor (TH1; faulty) • Fixing heater (H1; faulty) • DC controller/DC power supply (faulty) • Power supply frequency (error) 	<ul style="list-style-type: none"> • The temperature of the fixing heater is 215°C or more. • The temperature of the fixing heater does not reach 80°C within 2.5 sec after copying operation has started. • The temperature of the fixing heater lowers below 135°C after it has reached 150°C. • The temperature of the fixing heater does not reach 150°C within 7.5 sec after copying operation has started. • The power supply frequency is higher than specified. • The maximum supply power is detected for about 5 sec after the temperature of the fixing heater has reached 150°C.
E1	<ul style="list-style-type: none"> • Fixing film displacement (by faulty fixing unit) • Fixing film displacement sensor PCB (Q901; faulty) • DC controller/DC power supply PCB (faulty) 	<ul style="list-style-type: none"> • The fixing film displacement sensor (Q901) goes ON with the temperature of the fixing heater 100°C at time of power-on. • The fixing film displacement sensor (Q901) remains ON for about 5 sec during copying operation.

Note:

If an error associated with 'E0' is detected, 'E' is displayed (FC330) or the Jam indicator (FC310) remains ON for about 0.5 sec; thereafter, the power goes out.

Code	Cause	Description
E2	<ul style="list-style-type: none"> • Copyboard drive assembly (faulty operation) • Copyboard drive solenoid (SL2; faulty) • Copyboard position sensor PCB (Q704; faulty) • DC controller/DC power supply PCB (faulty) • Relay PCB (faulty) 	<ul style="list-style-type: none"> • The copyboard position sensor (Q704) goes ON when copying operation starts. • The copyboard position sensor (Q704) is ON 0.5 sec after copying operation has started. • The copyboard position sensor (Q704) does not go ON within 4.5 sec after copying operation has started. • The copyboard does not reach the start position within a specific period, or it moves past the start position. • The copyboard position sensor (Q704) is ON 1 sec after the copyboard has started moving forward from the start position. • The copyboard position sensor (Q704) does not go ON 6.8 sec after the copyboard has started moving forward from the start position. • The copyboard position sensor (Q704) does not go ON 0.7 sec or 3 sec after the copyboard has started moving in reverse from the reversal position.
E5	<ul style="list-style-type: none"> • Fluorescent lamp (FL1; faulty) • Intensity sensor PCB (PD601; faulty) • DC controller/DC power supply PCB (faulty) 	<ul style="list-style-type: none"> • The scanning lamp does not reach the specified intensity within 45 sec after copying operation has started.

Note:

1. The copier does not use code 'E3', 'E4', or 'E5'.
2. After self diagnosis has gone ON, the copier may be reset by switching it OFF and then ON.
In the case of 'E0', however, the power is automatically turned OFF. To reset, disconnect the power plug once, or wait about 5.5 minutes without any operation; during the period, the microprocessor remains powered and retains 'E0'.
This consideration is to prevent the user from resetting the machine easily when the thermistor may have blown; otherwise, the fixing heater would become overheated, damaging parts near it.
3. Activation of self diagnosis forces the fixing heater (H1) and main motor (M1) OFF.

CHAPTER 4

MECHANICAL SYSTEM

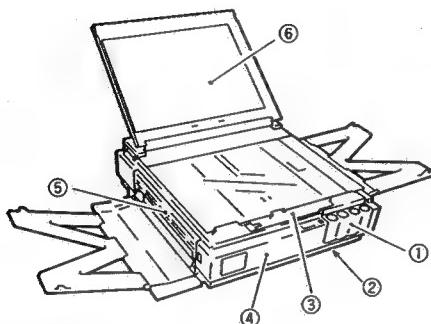
- 1. Disconnect the power cord for safety before disassembly or reassembly work.
- 2. Group the screws by type (length and diameter) and location.
- 3. The fixing screw for the grounding wire and variator is fitted with a washer to ensure electric continuity. Be sure to use the washer for reassembly.
- 4. If possible, avoid operating the machine with any of its parts removed.
- 5. Unless otherwise noted, reassembly is the reverse of disassembly.

I.	EXTERNALS	4-1
A.	External Covers	4-1
1.	Detaching the Control Panel Cover	4-1
2.	Detaching the Body Cover	4-1
3.	Detaching the Top Cover Assembly	4-2
4.	Detaching the Delivery Assembly Cover	4-3
5.	Detaching the Bottom Cover	4-3
B.	Copyboard Assembly	4-4
1.	Detaching the Copyboard Cover	4-4
2.	Detaching the Copyboard	4-4
II.	DRIVE SYSTEM	4-5
A.	Copyboard Drive Assembly	4-5
1.	Detaching the Copyboard Drive Assembly	4-5
B.	Main Motor Assembly	4-6
1.	Detaching the Main Motor Assembly	4-6
III.	FEEDING SYSTEM	4-7
A.	Pick-Up Roller Assembly	4-7
1.	Detaching the Pick-Up Roller	4-7
B.	Registration Roller Assembly	4-8
1.	Detaching the Registration Roller	4-8
C.	Feeding Assembly	4-9
1.	Detaching the Feeding Bell	4-9
IV.	EXPOSURE SYSTEM	4-10
A.	Scanning System	4-10
1.	Detaching the Scanning Lamp	4-10
2.	Attaching the Scanning Lamp	4-10
V.	CHARGING, DEVELOPING, AND CLEANING SYSTEM	4-11
A.	Cartridge	4-11
1.	Outline	4-11
2.	Cleaning the Drum	4-12
B.	Transfer Charging Roller	4-12
1.	Cleaning the Transfer Charging Roller	4-12
2.	Detaching the Transfer Charging Roller	4-12
VI.	FIXING SYSTEM	4-14
A.	Fixing Assembly	4-14
1.	Construction	4-14
2.	Detaching the Fixing Assembly	4-14
3.	Detaching the Pressure Roller	4-15
VII.	ELECTRICAL SYSTEM	4-16
A.	DC Controller/DC Power Supply PCB	4-16
1.	Detaching the DC Controller/DC Power Supply PCB	4-16
B.	Relay PCB	4-17
1.	Detaching the Relay PCB	4-17
C.	Control Panel PCB	4-17
1.	Detaching the Control Panel PCB	4-17

I. EXTERNALS

A. External Covers

Detach the covers as follows to clean, inspect, or repair the inside of the machine.



- ① Control panel cover
- ② Bottom cover
- ③ Top cover
- ④ Body cover
- ⑤ Delivery assembly cover
- ⑥ Copyboard cover

Figure 4-101

1. **Detaching the Control Panel Cover**
- 1) Move the copyboard cover to the left until it stops.
- 2) Open the top cover, and remove the screw ①.
- 3) Detach the control cover ② as if to lift it to the front.

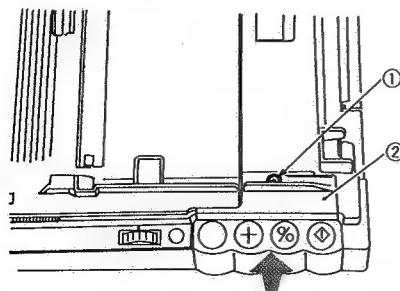


Figure 4-102

Note:

When attaching the FC310's control panel cover, fit the VR on the control panel PCB into the groove of the density control lever.

2. Detaching the Body Cover

- 1) Detach the copyboard; see p. 4-4.
- 2) Detach the two cover plates ① by pulling them up.

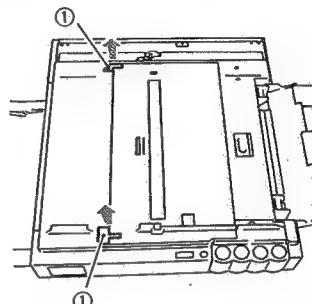


Figure 4-103

- 3) Detach the pick-up tray and delivery tray.
- 4) Detach the control cover.
- 5) Open the top cover, and take out the cartridge.
- 6) Press the delivery assembly cover open/close button to open the delivery cover.

Note:

You must disengage the five hooks that hold the body cover in place before detaching the body cover.

- 7) Push the hook found down the hole ③ in the body cover ② with a screwdriver, and lift the body cover slightly.

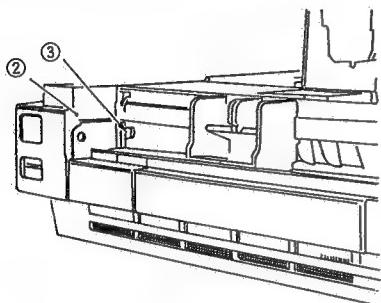


Figure 4-104 (right view)

- 8) Push the hook ④ found at the right rear of the body with a screwdriver, and lift the body cover ⑤ slightly.

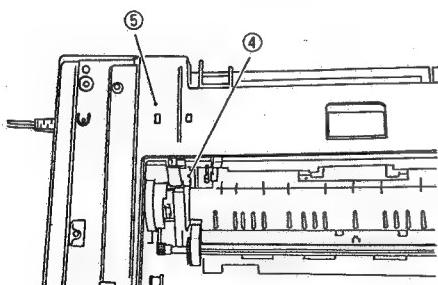


Figure 4-105

- 9) Detach the hook at the rear ⑥ as if to pull the body cover ⑦ to the front; then, lift the body cover slightly.

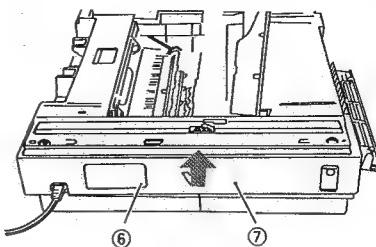


Figure 4-106 (rear view)

- 10) Disengage the two hooks at the front ⑧ as if to pull the body cover to the front.
- 11) Detach the body cover ⑨ by lifting it.

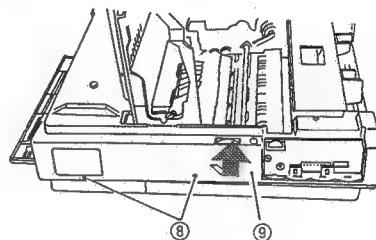


Figure 4-107

3. Detaching the Top Cover Assembly

- 1) Detach the body cover; see p. 4-1.
- 2) Disconnect the two connectors ①.

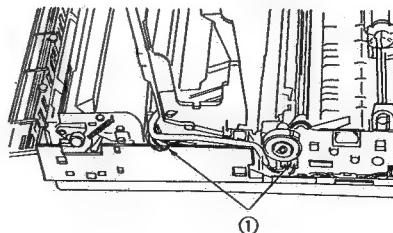


Figure 4-108

- 3) Bend the support ② at the front to the front, and remove the pin ③ from the top cover assembly.
- 4) Detach the top cover assembly ④.

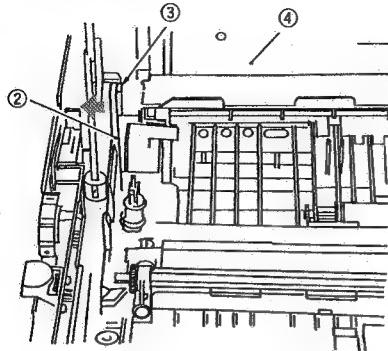


Figure 4-109

Note:

Pay attention to the position of the pressure release arm when attaching the top cover assembly; see Figure 4-110.

Pressure release arm (front) Pressure release arm (rear)

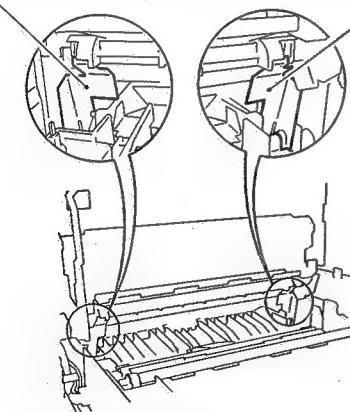


Figure 4-110

4. Detaching the Delivery Assembly Cover

- 1) Take out the fixing assembly; see p. 4-14.
- 2) Detach the delivery assembly cover ① from the rear.

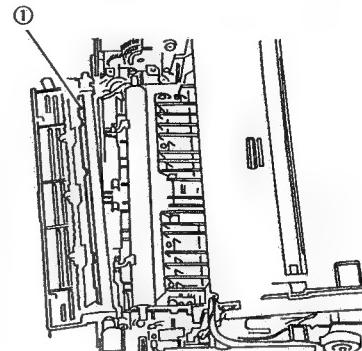


Figure 4-111

5. Detaching the Bottom Cover

- 1) Place the copier with the delivery assembly at the bottom; then, remove the two screws ①.

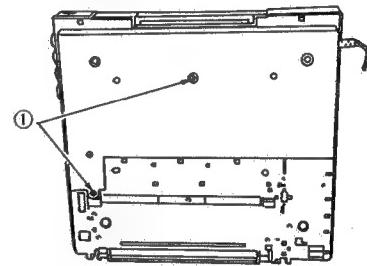


Figure 4-112

- 2) Disengage the five hooks ②, and detach the bottom cover ③.

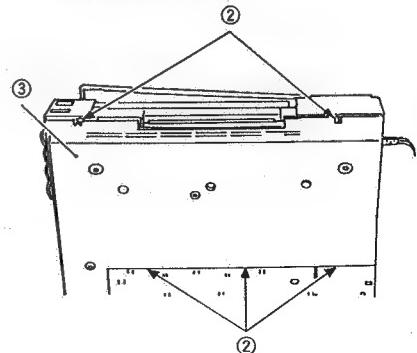


Figure 4-113

B. Copyboard Assembly

1. Detaching the Copyboard Cover

- Lift the right rear corner of the copyboard cover about 5 mm; then, slide it to the front.

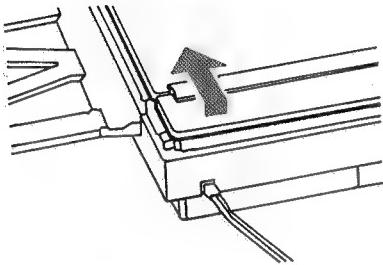


Figure 4-114

- Slide the left rear corner the same way.

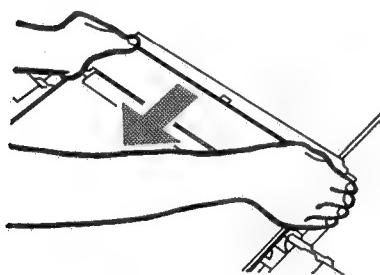


Figure 4-115

2. Detaching the Copyboard

- Move the copyboard ① to the left until it stops, and remove the two screws ②.

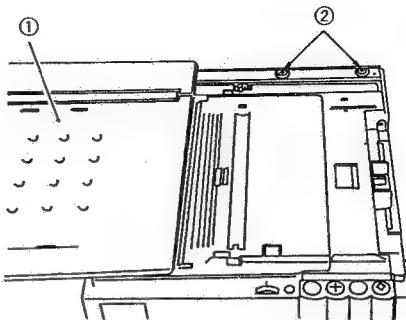


Figure 4-116

- Move the copyboard to the right by hand, and remove the screw ③; then, detach the copyboard ④.

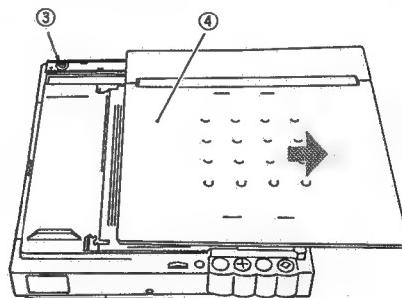


Figure 4-117

Note:

- Do not disassemble the rail.
- To attach the copyboard, fit the copyboard glass into the rail at the front, and screw the rear rail portion in place.

II. DRIVE SYSTEM

A. Copyboard Drive Assembly

1. Detaching the Copyboard Drive Assembly

- 1) Take out the fixing assembly; see p. 4-14.
- 2) Disconnect the two hooks ①, and detach the delivery door switch holder ② by pulling it up.

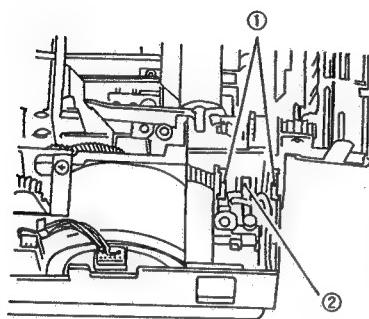


Figure 4-201 (left rear view)

- 3) Disconnect the two connectors ③.

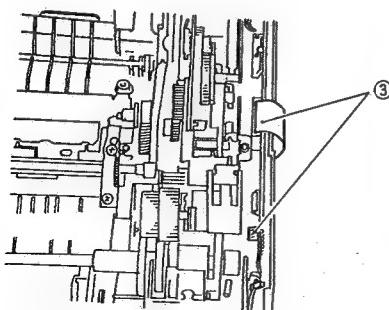


Figure 4-202 (rear view)

- 4) Remove the screw ④, and detach the cartridge support ⑤.

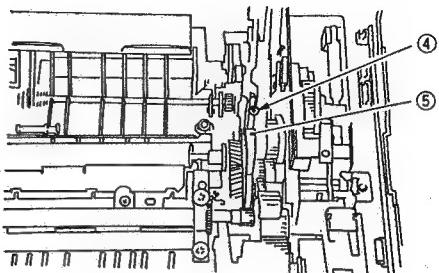


Figure 4-203

Note:

Take extra care not to damage the teeth of the gear when lifting the copyboard drive assembly.

- 5) Remove the eight screws ⑥, and detach the copyboard drive assembly ⑦ as if to lift it.

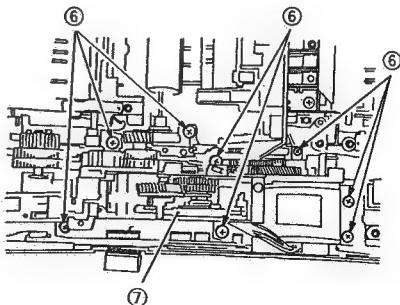


Figure 4-204

B. Main Motor Assembly

1. Detaching the Main Motor Assembly
- 1) Detach the copyboard drive assembly; see p. 4-5.
- 2) Disconnect the connector ①, and remove the four screws ②; then, detach the main motor assembly ③.

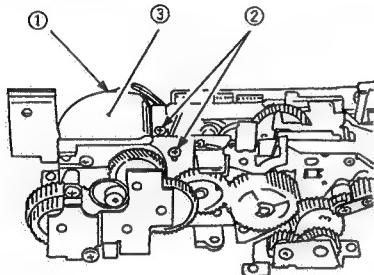


Figure 4-205A

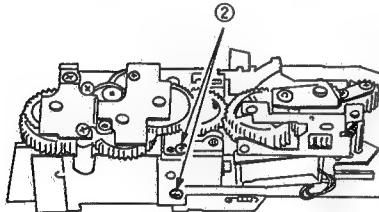


Figure 4-205B (bottom view)

Note:

Take extra care not to damage the teeth of the gear when lifting the main motor assembly.

III. FEEDING SYSTEM

A. Pick-Up Roller Assembly

1. Detaching the Pick-Up Roller

a. FC330

- 1) Detach the body cover; see p. 4-1.
- 2) Disengage the hook ①, and detach the solenoid ②.

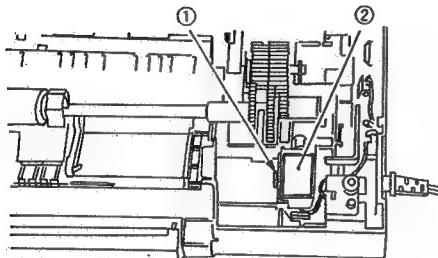


Figure 4-301 (right rear view)

- 3) Remove the spring ③, and detach the claw ④ of the control ring by pulling it up.

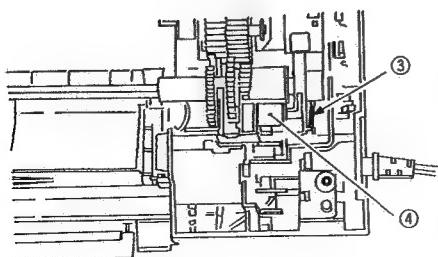


Figure 4-302

- 4) Bend the holding plate ⑤, and detach the pick-up roller bushing ⑥ by pulling it to the front.

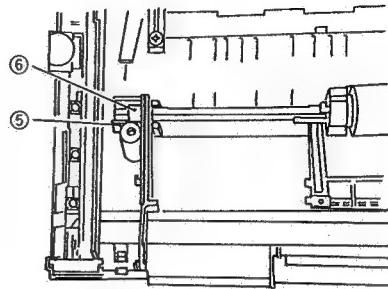


Figure 4-303

- 5) Move the pick-up roller assembly ⑦ to the front, and detach it from the rear.

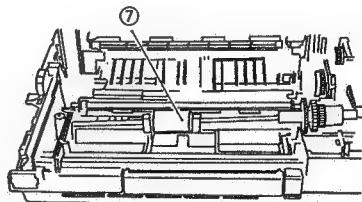


Figure 4-304

- 6) Disengage the hook ⑧, and detach the pick-up roller ⑩ and sub rollers ⑪ from the pick-up roller shaft ⑨.

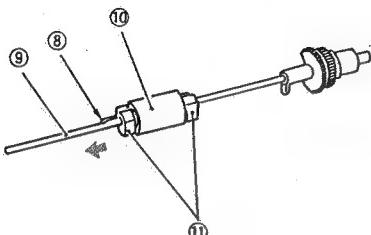


Figure 4-305

b. FC310

- 1) Detach the body cover; see p. 4-1.
- 2) Bend the pick-up roller support ①, and detach the pick-up roller ② from the rear by pulling it to the front.

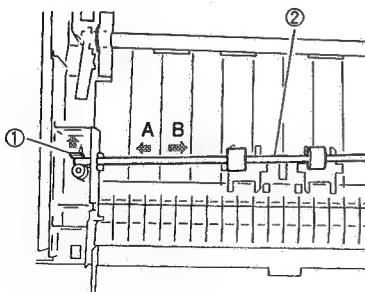


Figure 4-306

B. Registration Roller Assembly

1. **Detaching the Registration Roller Assembly**
- 1) Detach the copyboard drive assembly; see p. 4-5.
- 2) Remove the four screws ①, and detach the registration roller assembly ② while lifting its front slightly and as if to move it to the front.

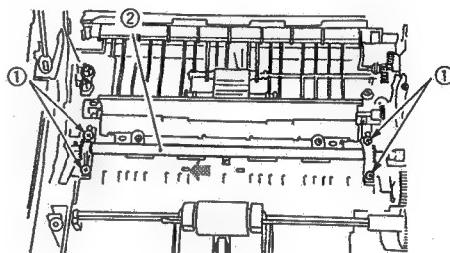


Figure 4-307

Note:

When attaching the registration roller assembly to the copier, make sure that the sheet shown in Figure 4-308 is above the registration roller (lower).

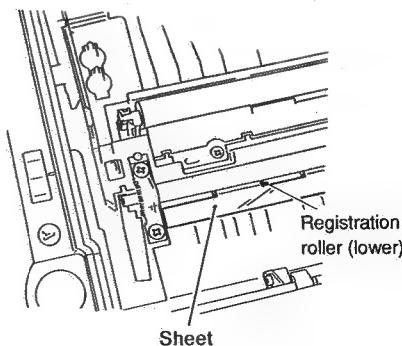


Figure 4-308

C. Feeding Assembly

1. Detaching the Feeding Belt

- 1) Detach the fixing assembly; see p. 4-14.
- 2) Remove the two screws ①, and detach the fixing assembly inlet guide ②.

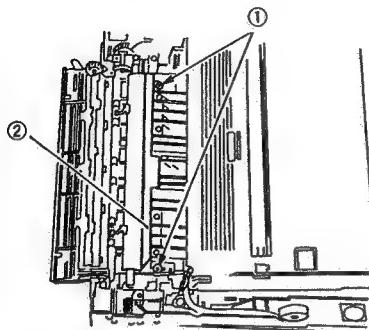


Figure 4-309

- 3) Bend the two feeding belt supports ③, and detach the feeding belt shaft ④.
- 4) Disengage the two hooks ⑤, and detach the feeding belt ⑥.

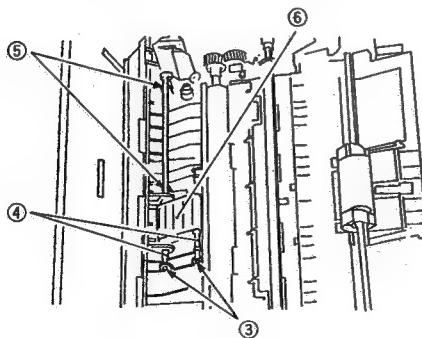


Figure 4-310

IV. EXPOSURE SYSTEM

A. Scanning System

1. Detaching the Scanning Lamp

- 1) Detach the top cover assembly; see p. 4-2.
- 2) Disengage the two hooks ① and pins ②, and detach the lamp holder ③.

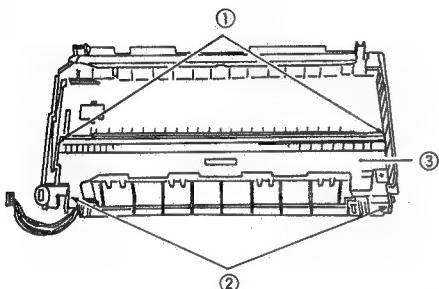


Figure 4-401

Note:

The hooks that hold the scanning lamp in place are designed to move left and right for adjustment at the factory.

Mark the positions with a scribe before detaching them.

- 3) Detach the scanning lamp ⑤ from the two hooks ④.

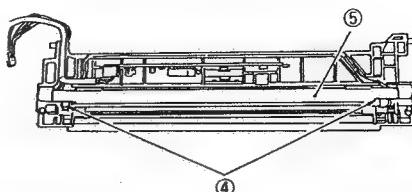


Figure 4-402

2. Attaching the Scanning Lamp

The scanning lamp must be attached so that the end with the longer harness is to the rear, and the side with the harness is at the bottom; see Figure 4-403. (Be sure to put the harness in the groove of the lamp holder.)

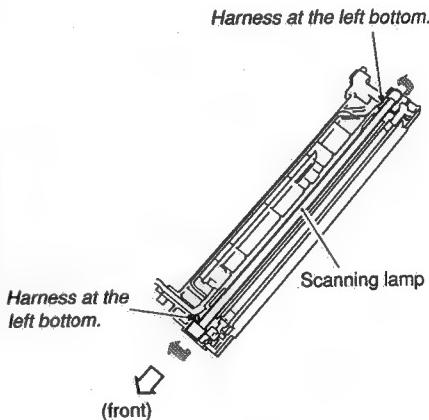


Figure 4-403

V. CHARGING, DEVELOPING, AND CLEANING SYSTEMS

A. Cartridge

1. Outline

The copier is a cartridge type, in that its photosensitive drum, primary charging roller, developing assembly, and cleaner are designed as a single entity.

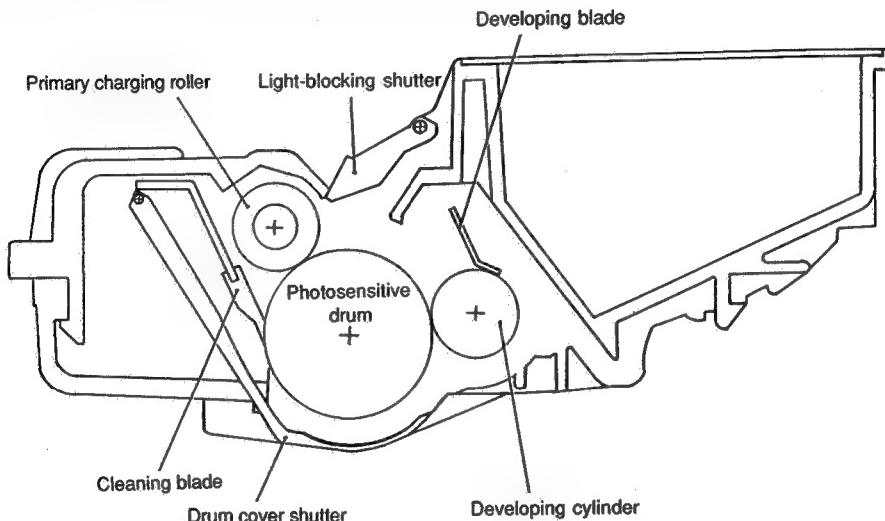


Figure 4-501

① Drum Cover Shutter

The photosensitive drum is susceptible to light; if exposed to strong light, it will develop residual memory, causing white spots or black lines on the copies. To avoid such problems, you must not open the drum cover shutter unless it is absolutely necessary. The drum cover shutter is designed to open when the cartridge is inserted into the copier and the copier's top unit is closed.

② Light-Blocking Shutter

The absence of a cartridge inside the copier allows light to enter the inside of the copier from the opening created for exposure. The light-blocking shutter is provided to protect the photo-sensitive drum against intrusion of such light.

2. Cleaning the Drum

Note:

As a rule, do not touch or clean the photosensitive drum.

- 1) Open the top cover, and take out the cartridge.
- 2) Put the cartridge upside down, and open the drum shutter.
- 3) Clean the surface of the drum using a flannel cloth coated with toner.

Note:

1. You must rotate the drum in the direction it rotates for making copies; otherwise, the leaf spring used to apply developing biases to the developing cylinder may cause faulty contact.
2. Use a flannel cloth; do not use paper, lint-free or otherwise.
3. Work quickly to protect the drum from light.

Reference:

The drum would recover to more or less its normal condition if left alone for five minutes in a dark place after exposure to an intensity of 1500 lux (about 5 minutes under general lighting). However, you must try to avoid any exposure at all cost. (The rays of the sun have intensities ranging between about 10000 and 30000 lux.)

B. Transfer Charging Roller

1. Cleaning the Transfer Charging Roller

- 1) Open the top cover, and take out the cartridge.
- 2) Wipe off the dirt from the transfer charging roller lightly using lint-free paper.

Note:

1. Do not use water or solvent.
2. Do not touch the roller; make sure the roller is free of solvent or oil.

2. Detaching the Transfer Charging Roller

- 1) Open the top cover, and take out the cartridge.
- 2) Remove the screw ①, and take out the transfer charging roller ② by pulling it up.

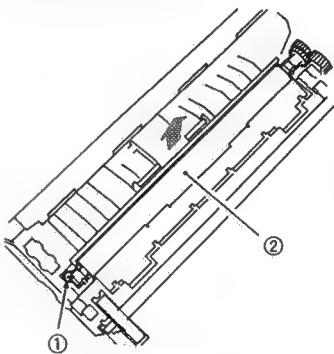
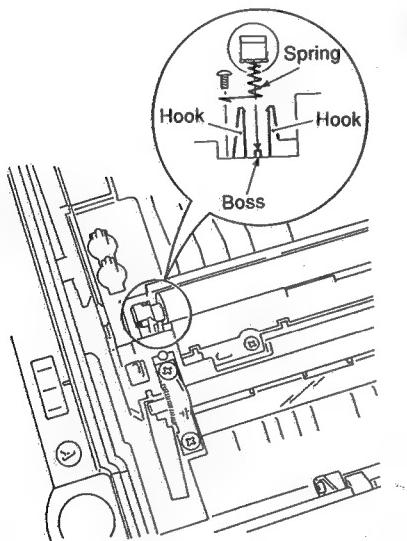
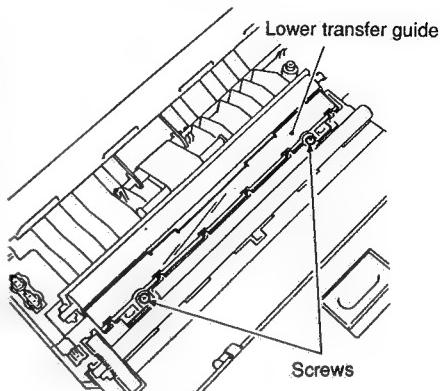


Figure 4-502

Note:

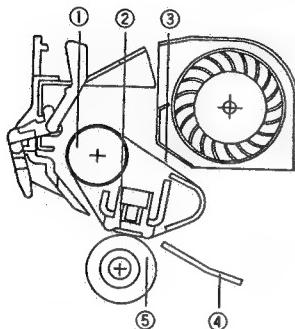
- i. Make sure that the spring is fitted with the boss in the center of the hook when attaching the transfer charging roller; see Figure 4-503.
- ii. The lower transfer guide is attached at the factory using a special jig and with high precision. Do not detach it in the field; see Figure 4-504.

**Figure 4-503****Figure 4-504**

VI. FIXING SYSTEM

A. Fixing Assembly

1. Construction



- ① Drive roller
- ② Fixing heater
- ③ Fixing film
- ④ Inlet guide
- ⑤ Pressure roller
(lower roller)

Figure 4-601

Note:

1. The fixing film is made of special material; do not touch it or leave dust on it.
2. The pressure exerted by the lower roller is controlled by the pressure spring built into the bushing.
3. The copier does not have an adjustment mechanism for roller pressure.

2. Detaching the Fixing Assembly

- 1) Detach the body cover; see p. 4-1.
- 2) Disconnect the five connectors ①.

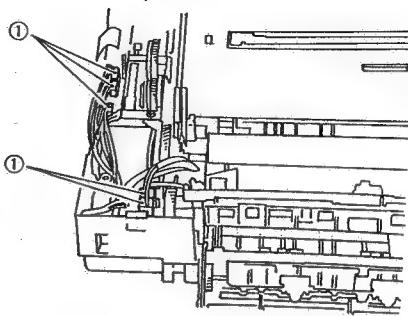


Figure 4-602

- 3) Remove the two screws ②, and detach the drive belt ③.

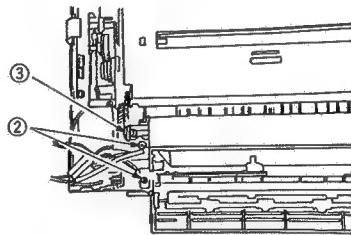


Figure 4-603

- 4) Move the fixing assembly ④ to the rear while lifting its rear; then, detach it by pulling it up.

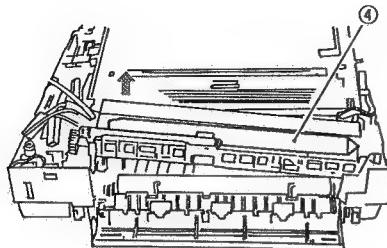


Figure 4-604

3. Detaching the Pressure Roller

- 1) Detach the fixing assembly; see p. 4-14.

Note:

Take care not to damage the pressure roller by the separation claw or inlet guide when detaching it.

- 2) Detach the pressure roller ① as if to lift it.

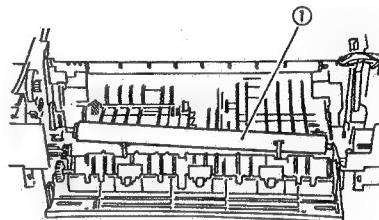


Figure 4-605

Note:

1. You cannot replace the fixing film or fixing heater; do not disassemble them.
2. Do not forget to attach the drive belt of the heat exhaust fan to the pulley when attaching the fixing assembly.

VII. ELECTRICAL SYSTEM

A. DC Controller/DC Power Supply PCB

1. Detaching the DC Controller/DC Power Supply PCB

 - 1) Detach the bottom cover; see p. 4-3.
 - 2) Disconnect the two connectors ① at the front.

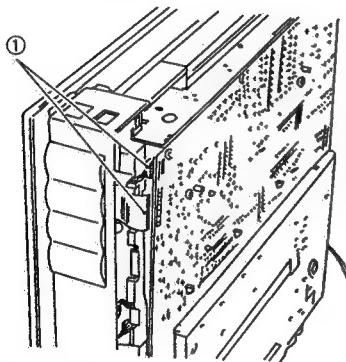


Figure 4-701

- 3) Disconnect the three connectors ② at the rear, and detach the grounding wire ③.

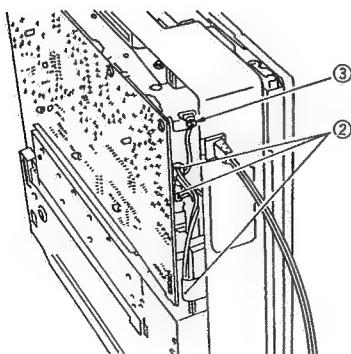


Figure 4-702

Note:

The DC controller/DC power supply PCB has high-voltage contacts and pick-up sensor lever; take extra care not to damage the parts when detaching the PCB.

- 4) Remove the two screws ④, and disengage the three hooks ⑤; then, detach the DC controller/DC power supply PCB ⑥.

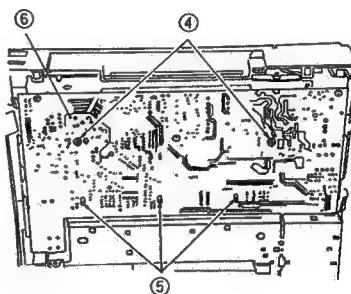


Figure 4-703

Note:

When attaching the DC controller/DC power supply PCB, make sure that lead wires are not bitten or shorted, or the connectors are not disconnected.

B. Relay PCB

1. Detaching the Relay PCB

- 1) Detach the copyboard drive assembly; see p. 4-5.
- 2) Disconnect the two connectors ①, and remove the screw ②.

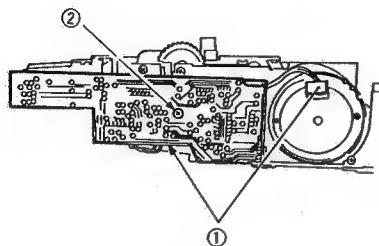


Figure 4-704

- 3) Move the relay PCB ③ to the left to detach it.

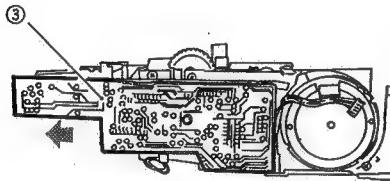


Figure 4-705

C. Control Panel PCB

Note:

You must adjust the VR for intensity and AE after replacing the control panel PCB; see p. 3-49.

1. Detaching the Control Panel PCB

- 1) Detach the body cover; see p. 4-1.
- 2) Disconnect the three connectors ①, and disengage the hook ②.
- 3) Detach the control panel PCB ③ by pulling it up.

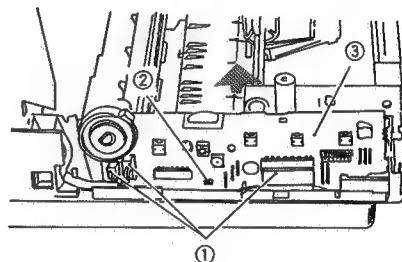


Figure 4-706

CHAPTER 5

INSTALLATION

The product is carefully adjusted and strictly inspected before it leaves the factory; therefore, proper installation is very important in maintaining its out-of-factory performance. Make sure that all the conditions discussed in this chapter are satisfied before installation, and carry out all necessary inspections after installation.

I. SELECTING THE SITE
II. UNPACKING AND
INSTALLATION

5-1

5-2

III. RELOCATING THE
MACHINE

5-3

I. SELECTING THE SITE

Make the following considerations when selecting the site for the machine.

It is a good idea to visit the site before delivery of the machine.

- The site should provide an exclusive power outlet with a grounding terminal.
- The temperature and humidity of the site must be 7.5° to 32.5°C and 5% to 85%, respectively. Avoid areas near water faucets, water boilers, humidifiers, or refrigerators.
- Avoid areas near open fires and areas subjected to dust, ammonium gas, or sunlight. If necessary, provide curtains.
- The site must be well ventilated.
- The floor must be level, ensuring all copier's feet will remain in contact.
- The copier must be at least 10 cm from all walls, enabling sufficient space for copying work.

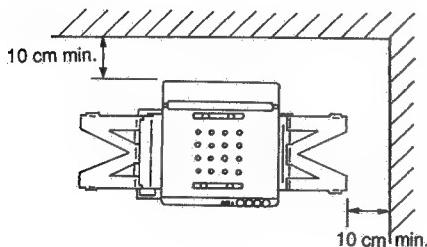
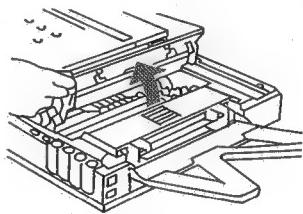
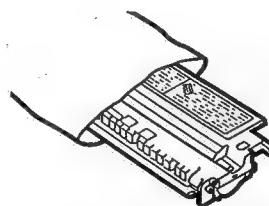
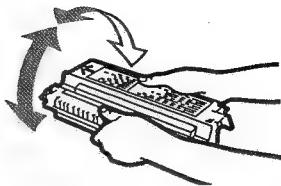
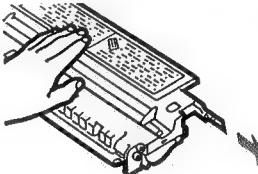
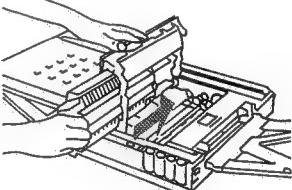
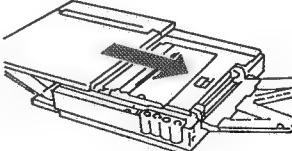


Figure 5-1

II. UNPACKING AND INSTALLATION

Moving a metal object from a cold to warm place can cause droplets of water to appear on its surface. The phenomenon is known as *condensation*, and condensation in the copier can trigger such problems as blank copies. If any such problem is expected, leave the copier alone at the site of installation at least one hour before unpacking it.

Step	Work	Description
1	Open the shipping carton.	
2	Take out the accessories.	Make sure that the Operator's Manual is in the box.
3	Remove the cover bag from the copier, and detach all strips of tape that hold parts.	<ul style="list-style-type: none"> • Check the covers for damage and deformation caused during transit. • Slide out the manual feed tray. • Slide out the delivery tray.
4	Move the copyboard to the left until it stops, and press the open/close button to open the copier's top cover.	
5	Take out the cartridge from the bag. (If the cartridge is installed in the copier, pull it out to the front.)	

Step	Work	Description
6	Hold the cartridge with its Warning label facing up, and rotate it in both directions about 90°.	
7	Place the cartridge on a level place; then, detach the tip of the seal, and pull it fully out (about 50 cm).	
8	Hold the cartridge with its Warning label facing left, and slide in the cartridge slowly until it stops.	
9	Close the top cover, and return it to the center.	

Step	Work	Description
10	Connect the power cord to the power outlet and the copier, and switch the copier ON.	<ul style="list-style-type: none"> Press the +, Clear/Stop, and other keys to make sure that the copy count is correctly indicated (FC330). Check that '1' goes ON on the display (FC330). Check the Main indicator goes ON (FC310). Check the movement of the copy density lever/ dial.
11	Set the Test Sheet on the copyboard, and make copies; make sure that copies are made properly.	<ul style="list-style-type: none"> Make sure no abnormal noise is heard. Make sure that copies are made in the specified number properly (FC330). Check that 'P' is indicated when the Copy Start key is pressed without setting copy paper (FC330).
12	Clean the exterior of the copier and the area around it.	

III. RELOCATING THE MACHINE

If you must relocate the machine by truck or other means of transportation, perform the following:

Step	Work	Checks	Remarks
1	Switch the machine OFF, and disconnect the power plug.		
2	Take out the cartridge, and fold the copy tray and pick-up tray.		Put the cartridge in its storage box, and place it to protect against vibration.
4	Tape the top cover in place.		
5	Place a sheet of A4/LTR paper on the copyboard, and tape the copyboard in place.		

CHAPTER 6

MAINTENANCE AND SERVICING

- I. PERIODICALLY
REPLACED PARTS
- II. DURABLES

6-1

- III. PERIODICAL SERVICING
- IV. NOTES ABOUT CARTRIDGE

6-1
6-2

I. PERIODICALLY REPLACED PARTS

The machine does not have parts which must be replaced on a periodical basis.

II. DURABLES

The machine does not have parts which are classified as durables.

III. PERIODICAL SERVICING

The machine does not have parts that require periodical servicing.

IV. NOTES ABOUT CARTRIDGE

The cartridge is affected by the environment, regardless of whether it is sealed or unsealed and installed in the machine or otherwise. Although the properties of the cartridge change over time independent of how many copies have been made, the degree of care taken for the cartridge affects how long it may remain stable.

A. Storing Sealed Cartridges

When storing the cartridge in a warehouse or workshop, make sure the place is controlled to the specifications shown in Table 6-1.

- Avoid direct rays of the sun.
- Avoid areas subjected to appreciable vibration.
- Do not drop or subject it to impact.

Temperature	Normal (9/10 of period)		0° to 35°C
	Severe (1/10 of period)	High	35° to 40°C
		Low	-20° to 0°C
Temperature fluctuations (within about 3 min)		40°C → 15°C	-20°C → 25°C
Humidity	Normal (9/10 of period)		35 to 85%RH
	Severe (1/10 of period)	High	85 to 95%RH
		Low	10 to 35%RH
Atmospheric pressure		460 to 760 mmHg (0.1 to 1 atm)	

Table 6-1 Temperature/Humidity Specifications

Temperature	Humidity
-20° to 40°C	90% or less

Table 6-2 Transportation

B. Storing and Handling Unsealed Cartridges

The photosensitive medium is an organic photoconductor (OPC), which is extremely susceptible to light. Since the cartridge also contains toner, you must be extra careful when storing or handling the cartridge. Make sure the user is aware of this fact and will handle the cartridge with care.

1. Storing Unsealed Cartridges

- Avoid areas subjected to strong rays of the sun. Do not keep it in a car even in a protective box; the inside may become extremely hot.
- Avoid areas of high or low temperature/humidity and areas where these factors tend to change rapidly (for example, near air conditioners or heaters).
- Avoid areas where dust, ammonium gas, or gases from organic solvents tend to accumulate.
- Keep the cartridge in a place 40°C or less.

2. Handling the Cartridge

- a. When setting the cartridge to the copier or if the toner starts to run short, hold the cartridge horizontally as shown in Figure 6-1, and rotate it in both directions about 90° to even out the toner inside it. Do not shake the cartridge or hold it in a different way; otherwise, toner may leak out the cartridge.

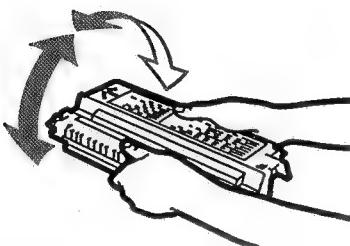


Figure 6-1

- b. Do not place the cartridge upright or upside down; do not shake it.

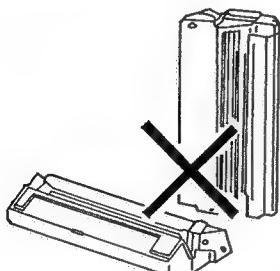


Figure 6-2

- c. Do not force open the shutter for the photosensitive drum cover found at the bottom of the cartridge; do not touch the surface of the photosensitive drum.

If the surface of the photosensitive drum has become soiled, wipe it using a flannel cloth coated with toner. Do not dry wipe it or use solvent.

- d. Do not disassemble the cartridge.
- e. Do not subject the cartridge to vibration or impact; in particular, do not force down the photosensitive drum from above the shutter for the drum cover.
- f. Keep the cartridge out of reach of children.
- g. The photosensitive drum is susceptible to light and, therefore, equipped with a light-blocking shutter; nevertheless, exposure to light for a long time can affect the drum, resulting in copies with white spots or vertical lines. Leave the copier alone for some time for possible recovery; to avoid residual memory, which results in white spots or vertical lines, however, keep the following in mind.

Note:

Work quickly when removing jams or replacing cartridges.

When the cartridge must be removed for work, be sure to put the cartridge in its storage box or cover it; do not leave it without protective measures once it is outside the copier.

Reference:

The drum would recover to more or less its normal condition if left alone for five minutes in a dark place after exposure to an intensity of 1500 lux (about 5 minutes under general lighting). However, you must try to avoid any exposure. (The rays of the sun have intensities ranging between about 10000 and 30000 lux.)

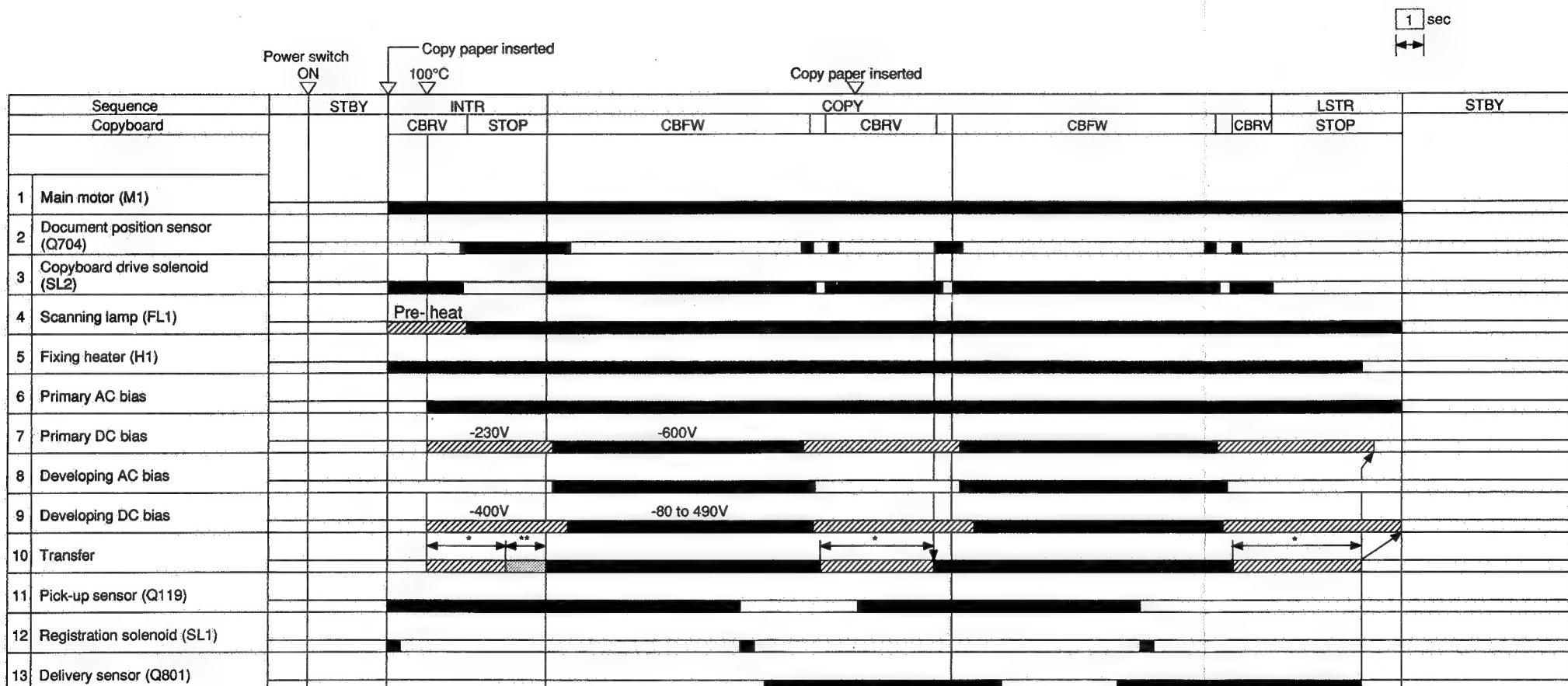
APPENDIX

- A. GENERAL TIMING CHART ----- A-1
- B. SIGNALS/ABBREVIATIONS LIST ----- A-3
- C. GENERAL CIRCUIT DIAGRAM ----- A-5
- D. DC CONTROLLER/DC POWER
SUPPLY PCB CIRCUIT DIAGRAM ----- A-7
- E. INTENSITY/AE SENSOR PCB
CIRCUIT DIAGRAM ----- A-11

- F. CONTROL PANEL PCB CIRCUIT
DIAGRAM ----- A-13
- G. RELAY PCB CIRCUIT DIAGRAM ----- A-10
- H. SPECIAL TOOLS TABLE ----- A-17
- I. SOLVENTS/OILS TABLE ----- A-17

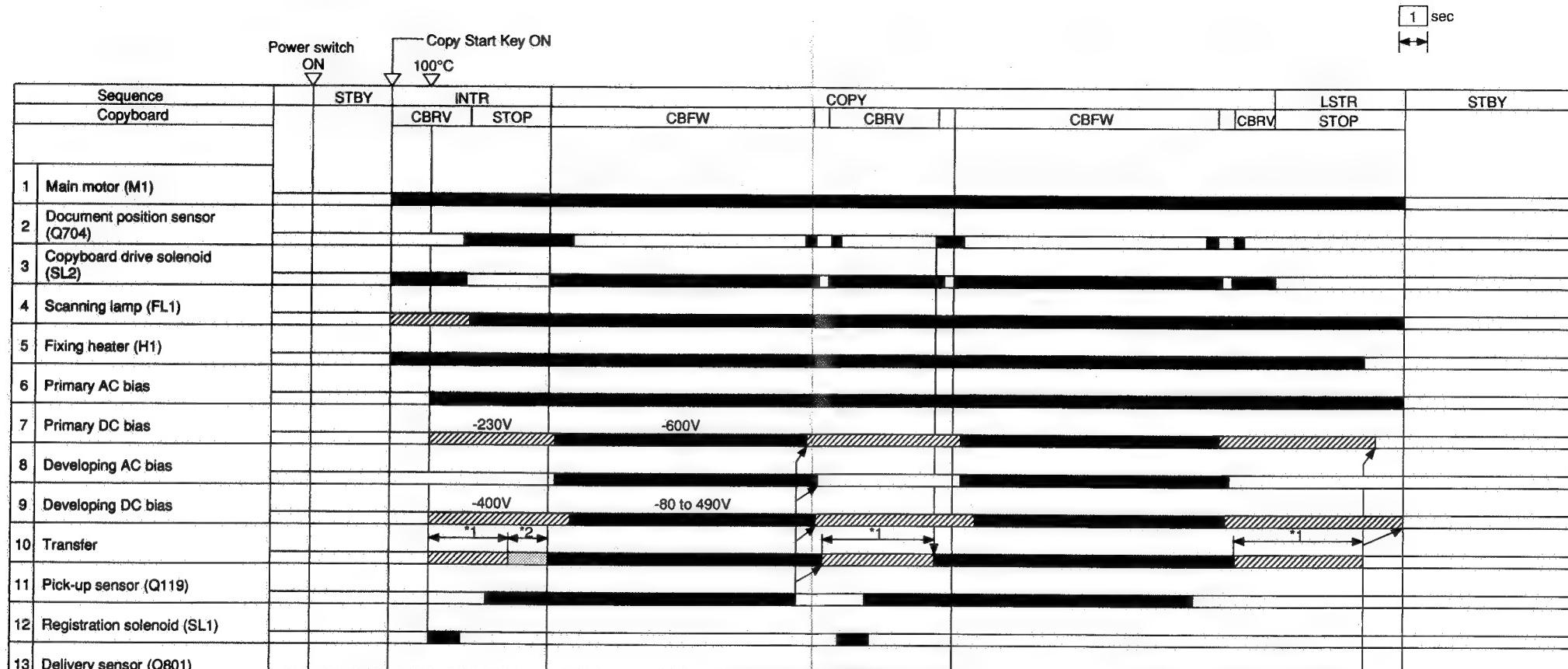
A. GENERAL TIMING CHART

FC310 General Timing Chart
(A4, 2copies)



* Cleaning mode.
** Measurement mode.

FC330 General Timing Chart
(A4, 2 copies)



* Cleaning mode

** Measurement mode

B. SIGNALS/ABBREVIATIONS LIST

What follows below is a list of signals and abbreviations used in the chapters of the manual and circuit diagrams.

The abbreviations within parentheses represent analog signals, which cannot be expressed in terms of '1' or '0'.

1. Signals

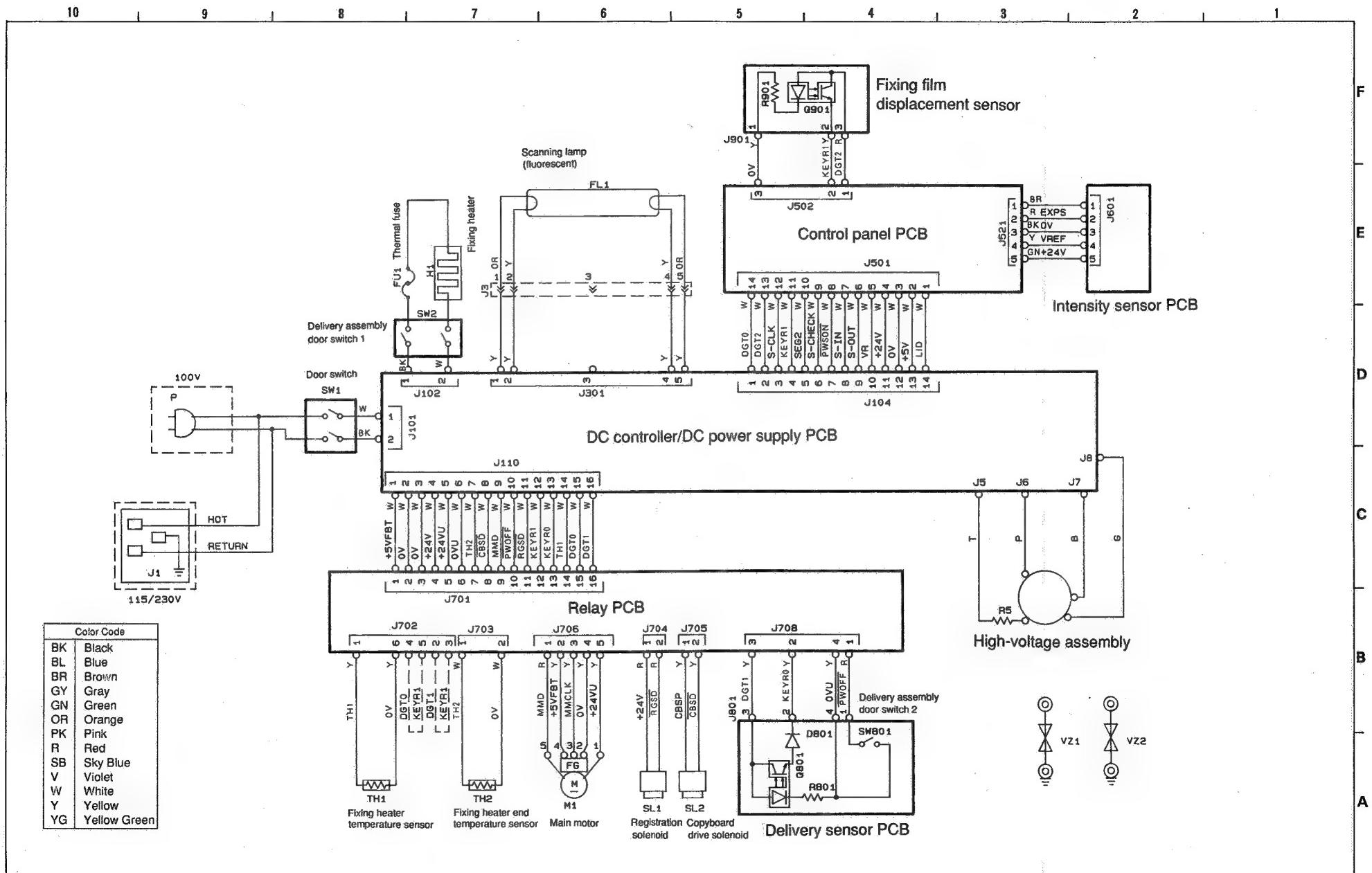
ACBTP	AC BIAS TIMING PULSE command
[AE]	AE signal
CBSD	COPYBOARD DRIVE SOLENOID DRIVE command
DCBPWM	DC BIAS CONTROL command
DCTPWM	TRANSFER DC BIAS CONTROL command
DGT0	OSCILLATION signal 0
DGT1	OSCILLATION signal 1
DGT2	OSCILLATION signal 2
FLPWM	FLUORESCENT LAMP DRIVE command
HTRD	FIXING HEATER DRIVE command
HVPAC	PRIMARY AC BIAS ON command
HVPDC	PRIMARY DC BIAS ON command
HVPHO	PRIMARY DC BIAS HIGH OUTPUT command
HVTDC	TRANSFER DC BIAS ON command
KEYR0	RETURN signal 0
KEYR1	RETURN signal 1
[LID]	LAMP INTENSITY DETECTION signal
MMCLK	MAIN MOTOR CLOCK PULSE signal
MMD	MAIN MOTOR DRIVE command
PWOFF	POWER OFF command
PWSON	POWER SWITCH ON signal
PUSD	PICK-UP ROLLER SOLENOID DRIVE command
RELAYED	RELAY DRIVE command
RGSD	REGISTRATION SOLENOID DRIVE command
[TH1]	THERMISTOR signal 1
[TH2]	THERMISTOR signal 2
TREV	TRANSFER REVERSE DC BIAS ON command
VPEAK	VOLTAGE PEAK DETECT signal
ZXDP	ZERO CROSS DETECTION signal

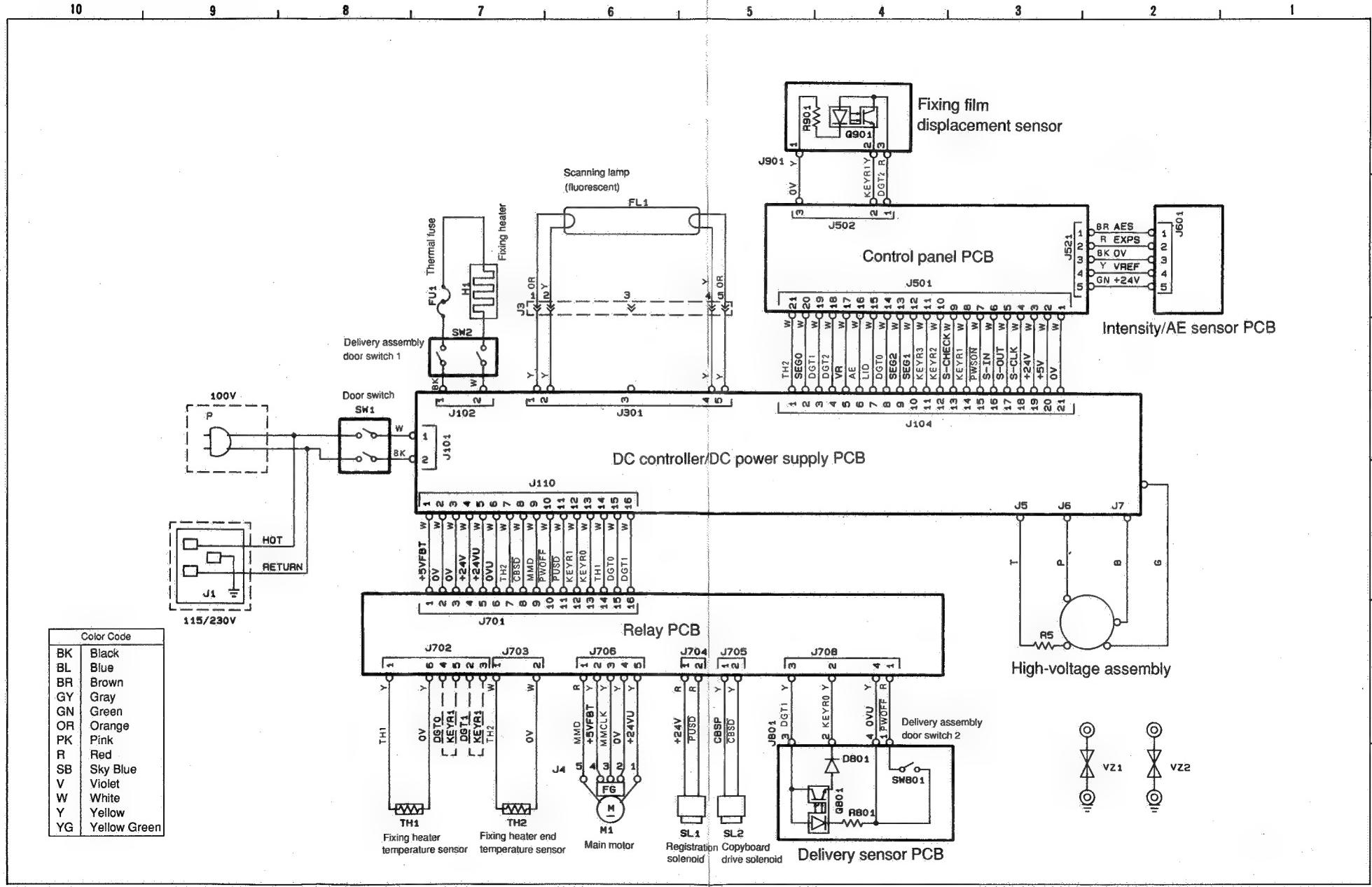
2. Abbreviations

INTR	INITIAL ROTATION
LSTR	LAST ROTATION
CBFW	COPYBOARD FORWARD
CBRV	COPYBOARD REVERSE
STBY	STANDBY

C. GENERAL CIRCUIT DIAGRAM

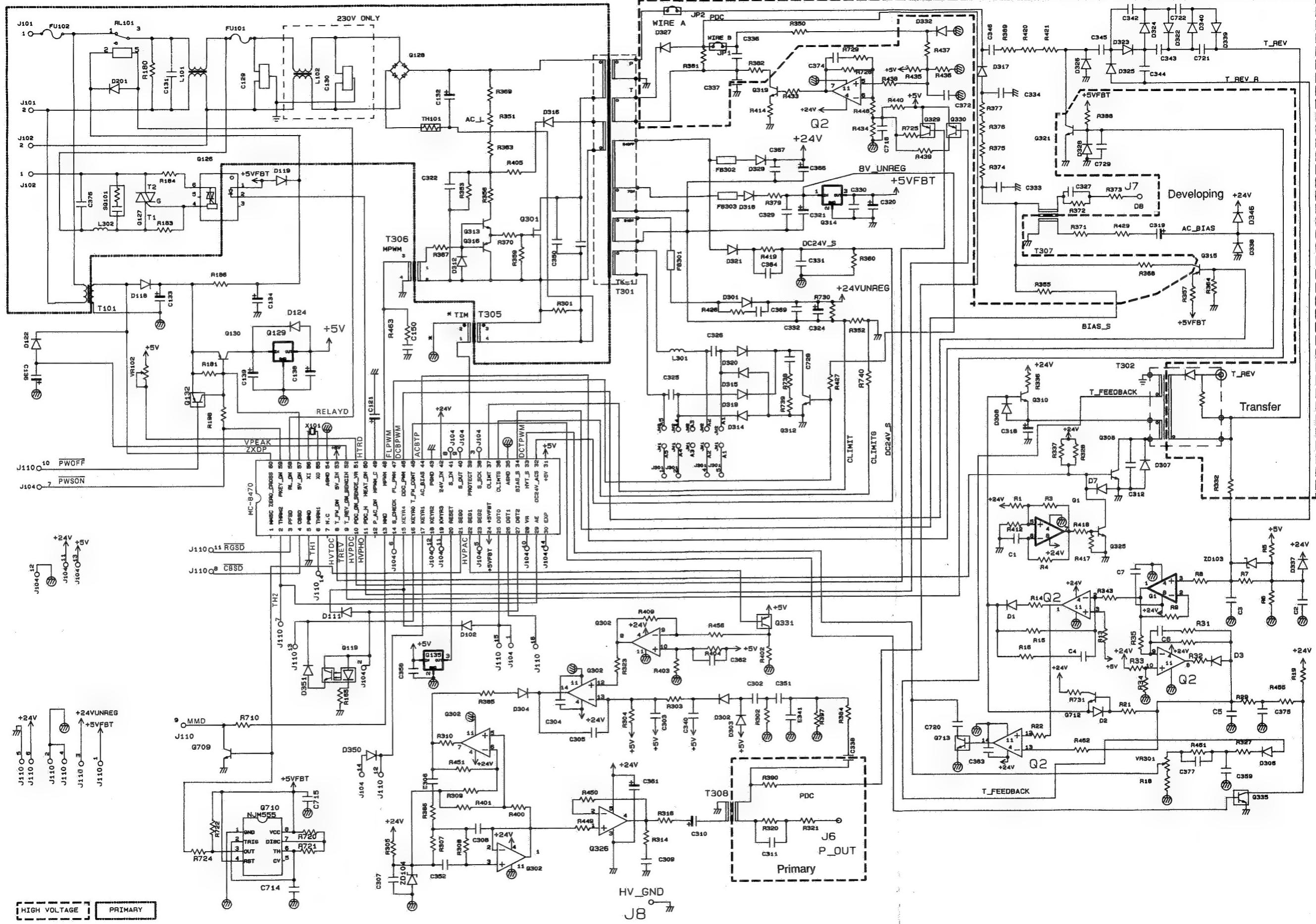
FC310 GENERAL CIRCUIT DIAGRAM

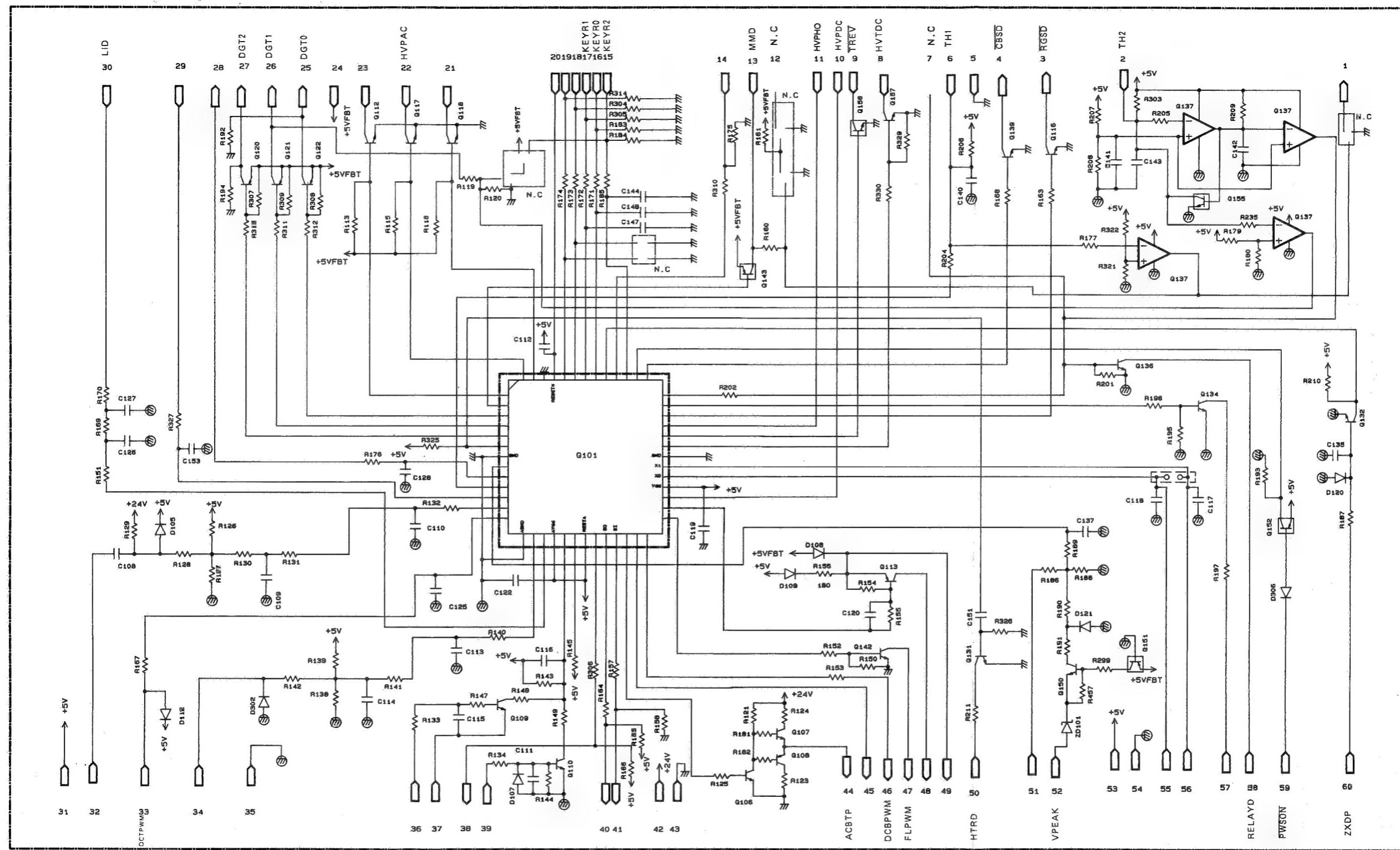


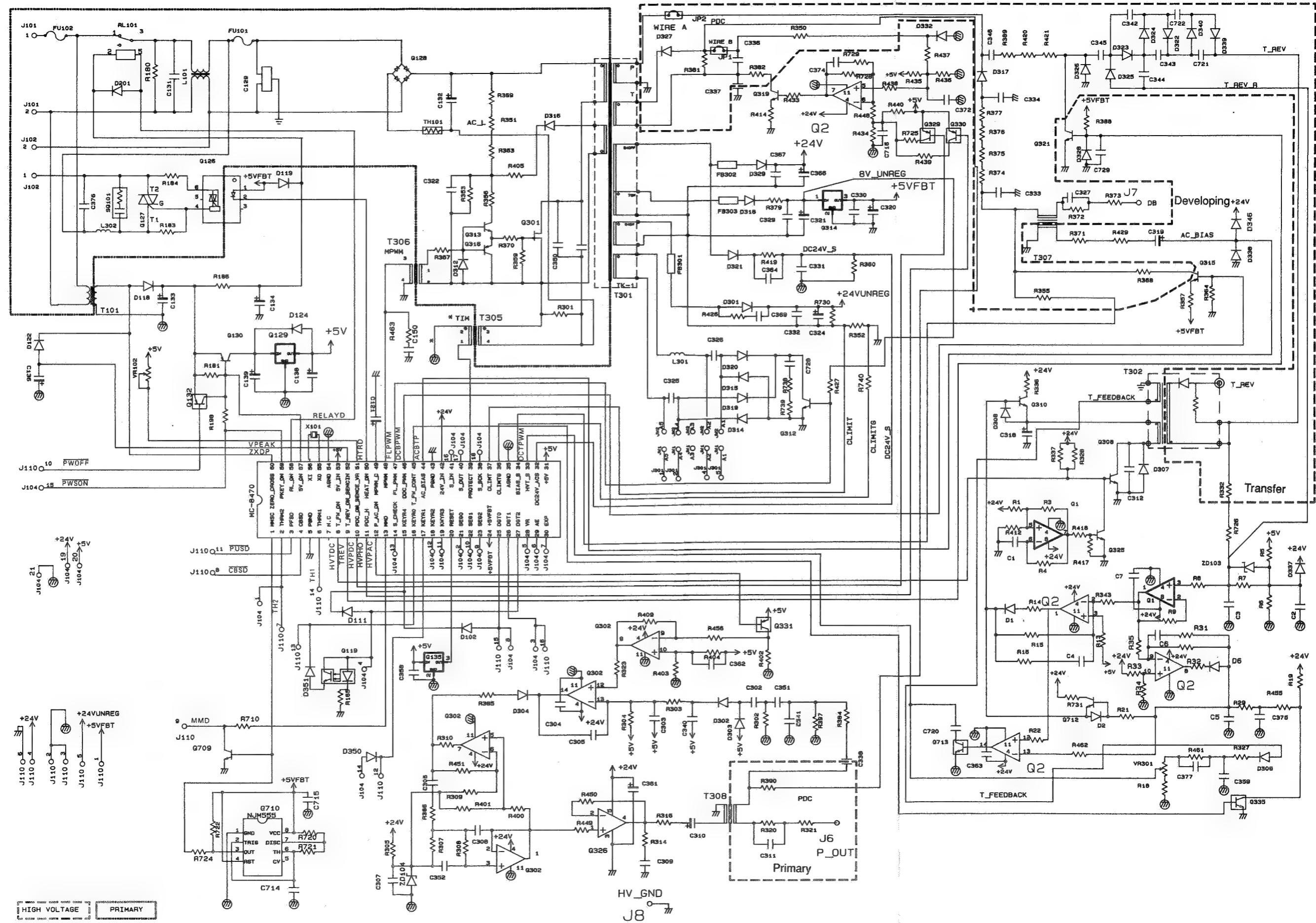


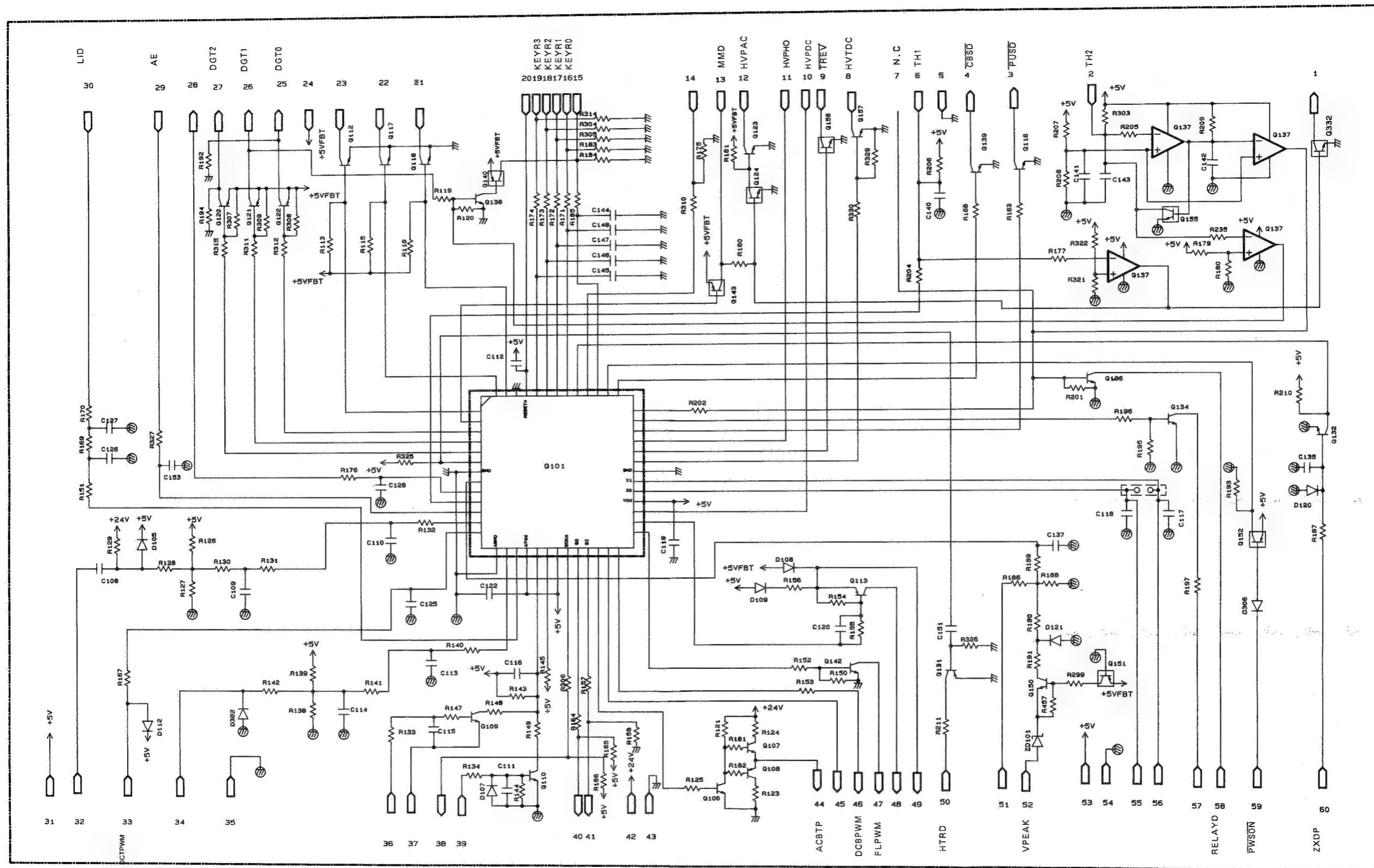
D. DC CONTROLLER/DC POWER SUPPLY PCB CIRCUIT DIAGRAM

FC310 DC CONTROLLER/DC POWER SUPPLY PCB CIRCUIT DIAGRAM (1/2)



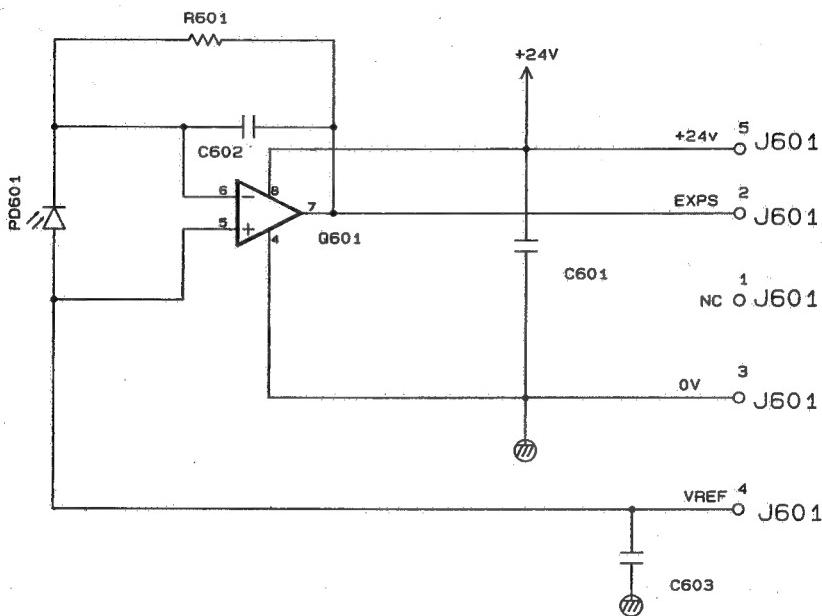




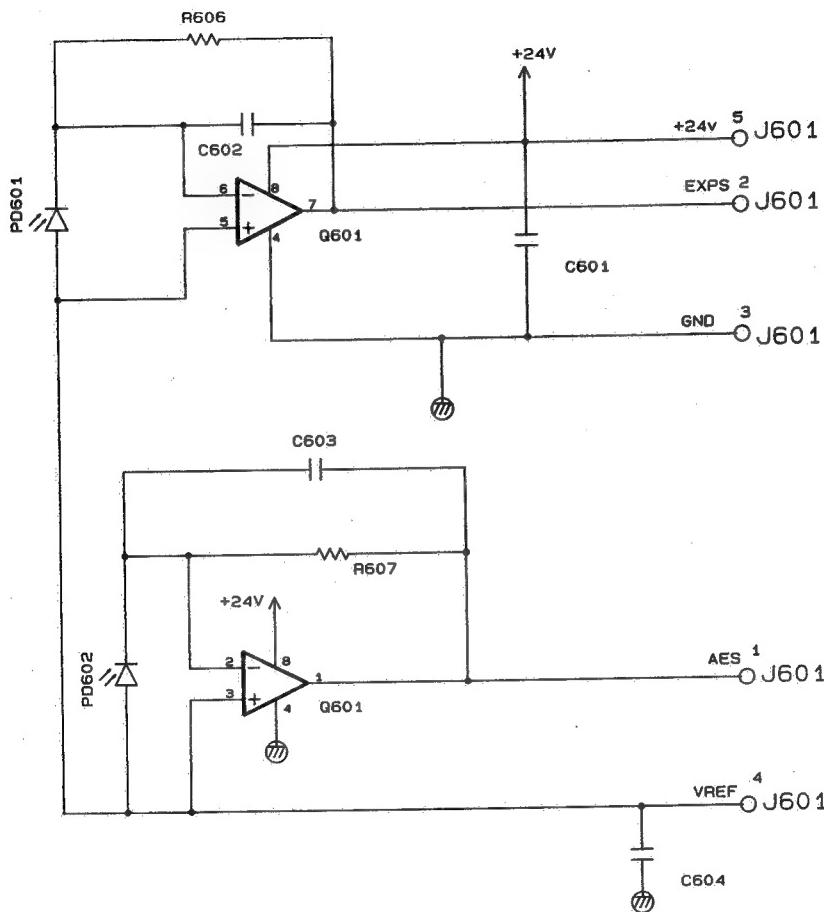


E. INTENSITY/AE SENSOR PCB CIRCUIT DIAGRAM

FC310 INTENSITY SENSOR CIRUCT DIAGRAM

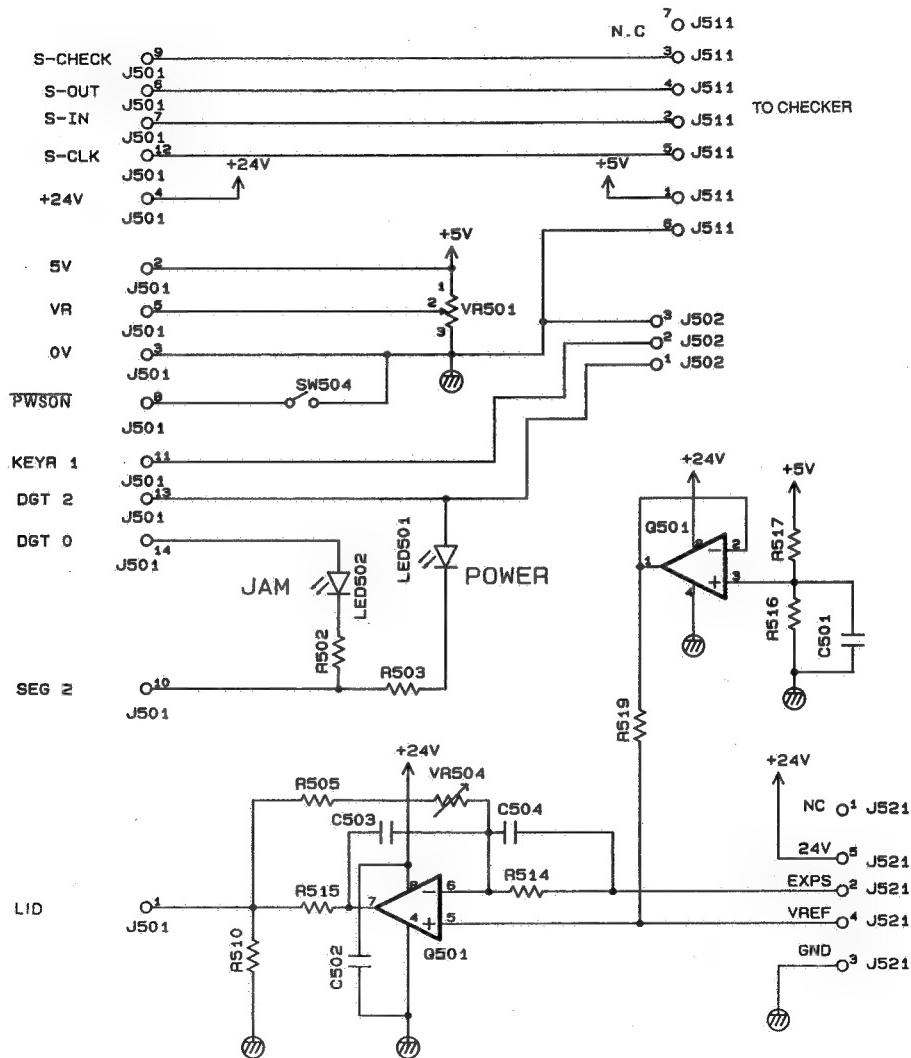


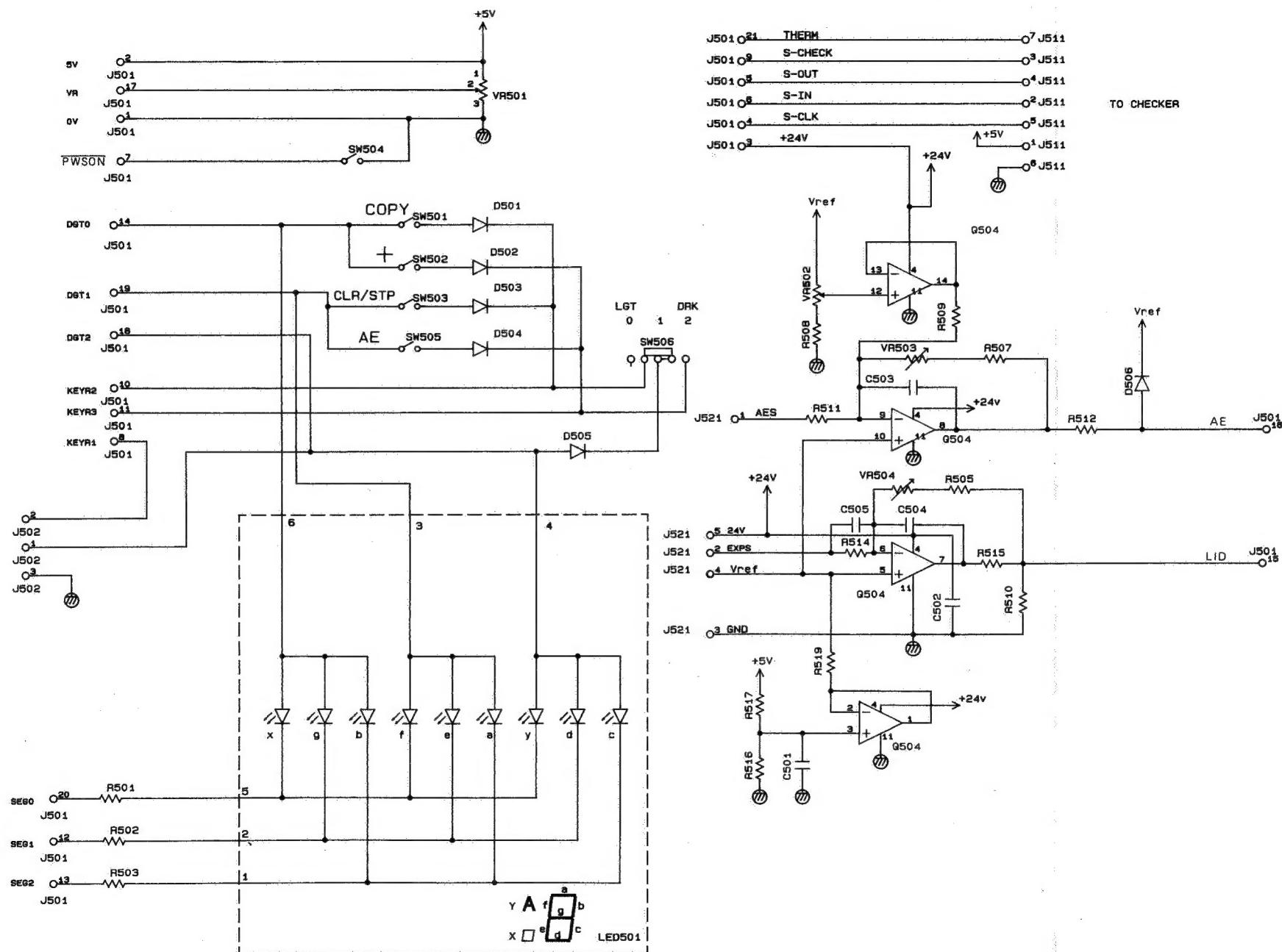
FC330 INTENSITY/AE SENSOR CIRCUIT DIAGRAM



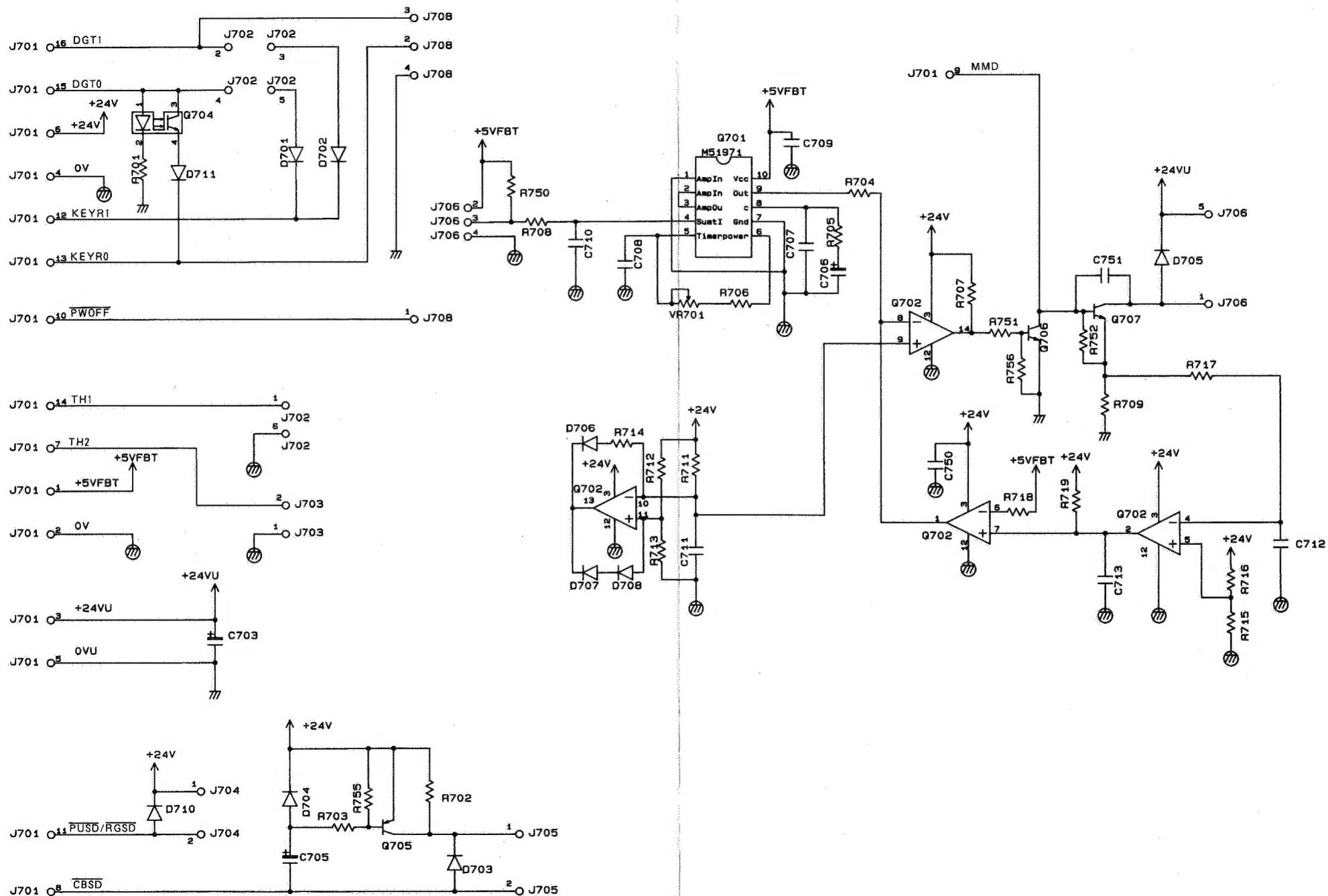
F. CONTROL PANEL PCB CIRCUIT DIAGRAM

FC310 CONTROL PANEL PCB CIRCUIT DIAGRAM



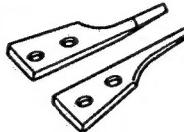


G. RELAY PCB CIRCUIT DIAGRAM



H. SPECIAL TOOLS TABLE

What follows below is a table of special tools used for servicing the machine in addition to the standard tools set.

No.	Tool name	Tool Number	Shape	Category*	Remarks
-	Stop ring/plier replacement	CK-0426		B	Removing the grip stop ring; 4 to 9 mm.

*The tools are categorized as follows:

- A: tools that must be carried by each service technician.
- B: tools that must be carried by a group of about five service technicians.
- C: tools that must be held by each workshop.

I. SOLVENTS/OILS TABLE

No.	Name	Uses	Composition	Remarks
1	Alcohol	Cleaning: e.g., glass, plastic, rubber parts; external covers	Hydrocarbon (fluorine family) Alcohol Surface active agent	<ul style="list-style-type: none"> • Do not bring near fire. • Procure locally. • Isopropyl alcohol may be substituted.
2	Solvent	Cleaning: e.g., metal; oil or toner dirt	Hydrocarbon (fluorine/chlorine family) Alcohol	<ul style="list-style-type: none"> • Do not bring near fire. • Procure locally.
3	Heat-resisting grease	Lubricating: Drive assemblies	Lithium soap (mineral oil family) Molybdenum bisulfate	• CK-0427 (500 g/can)
4	Lubricating oil		Mineral oil (paraffin family)	• CK-0451 (100 cc)
5	Lubricating oil		Mineral oil (paraffin family)	• CK-0524 (100 cc)

Canon



The printing paper contains
70% reused paper.